DEVELOPMENT OF HIGH-SPEED TRANSPORTATION CORRIDORS, INCLUDING THOSE WHICH MAY UTILIZE MAGNETIC LEVITATION TECHNOLOGY

(101-79)

HEARING

BEFORE THE

SUBCOMMITTEE ON SURFACE TRANSPORTATION

OF THE

COMMITTEE ON

PUBLIC WORKS AND TRANSPORTATION

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

MAY 3, 1990

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SUBCOMMITTEE ON SURFACE TRANSPORTATION

HEARINGS ON THE

DEVELOPMENT OF HIGH SPEED TRANSPORTATION CORRIDORS

MAY 3, 1990

SUMMARY OF SUBJECT MATTER

On Thursday, May 3rd, at 10:00 A.M., in Room 2167 RHOB, the Subcommittee on Surface Transportation will hold a hearing to provide a comprehensive review of the potential development of high speed transportation corridors, including those which may utilize magnetic levitation technology. Corridors under active discussion include those in California, Florida, Illinois, Minnesota, Nevada, Ohio, Pennsylvania, Texas, and Wisconsin.

Specifically, the hearing will focus on the use of Interstate Highway right-of-way for the construction of these systems, which many potential system operators assume to be necessary for eventual profit-making operations. What arrangements, such as grants, leases, MOU's, etc., would be necessary to allow the use of Interstate rights-of-way by high speed transportation system operators? Does the development of these systems open the door for other commercial operations to be built in Interstate right-of-way? Also, should Highway Trust Fund revenue, which is generated by highway users, be used for the design and construction of these private, profit-making systems? Finally, what are the highway safety impacts of the construction of these projects?

Existing Laws and Regulations

Current Federal Highway Administration regulations tightly restrict the use of, and access to, the rights-of-way along the Interstate Highway System. These regulations are primarily interpretations of Section 111 of Title 23, U.S.C., which prohibits the use of the Interstate rights-of-way, including the airspace above or below the grade line of the highway pavement, if such use would impair the full use or safety of the highway or otherwise interfere in any way with the free flow of traffic on the Interstate System.

Section 142 of Title 23, U.S.C., allows the U.S. DOT to make available without charge rights-of-way of any Federal-aid highway to a "publicly owned mass transit authority" for public transportation use if such use would not impair automobile safety or future highway improvements.

High Speed Transportation Corridors
Page two

Bills on this Subject Referred to the Subcommittee

H.Con.Res. 232	Establishes the sense of the Congress regarding the need to examine the contribution which MagLev may make to transportation (Hayes of Louisiana).
H.R. 3714	Directs U.S. DOT Secretary to issue regulations regarding use of Interstate Highway right-of-way for MagLev systems (Schumer).
H.R 4549	Establishes a new, "MagLev", modal Administrator within U.S. DOT; authorizes $350 million in design funds and $600 million for construction of a 40-mile MagLev demonstration system (Mrazek).

One additional House bill, H.R. 4515, was referred to the Committee on Energy and Commerce, and several other bills are pending in the Senate.

DEVELOPMENT OF HIGH SPEED TRANSPORTATION CORRIDORS, INCLUDING THOSE WHICH MAY UTILIZE MAGNETIC LEVITATION TECHNOLOGY

THURSDAY, MAY 3, 1990

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON SURFACE TRANSPORTATION,
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:18 a.m., in room 2167, Rayburn House Office Building, Hon. Norman Y. Mineta (chairman of the subcommittee) presiding.

Mr. MINETA. The subcommittee will please come to order. The Chair apologizes very much for being late.

I wish to thank the members of the subcommittee for attending this very important hearing this morning. And I'd also like to thank my very able and distinguished colleague from Pennsylvania, Mr. Shuster, for his cooperation and support in preparing for this hearing.

Today we are examining the development and construction of high-speed ground transportation systems, including those which may utilize magnetic levitation technology. The many high-speed corridors under active consideration for development include those in California, Florida, Illinois, Minnesota, Nevada, Ohio, Pennsylvania, Texas, and Wisconsin.

As our freeways and surface streets as well as our skies have become increasingly congested, the development of high-speed ground transportation has become increasingly attractive to these States. In certain areas of the country literally dozens of additional freeway lanes are projected to be needed in corridors where a high-speed alternative could eliminate many short-haul automobile trips.

Clearly it is in our best national interest, as the recently released national transportation policy recognized, to examine the potential contribution of high-speed ground transportation systems in meeting our capacity needs.

Of special interest to this subcommittee is the fact that many of the potential operators of these high-speed systems anticipate using the right-of-way of interstate highway systems in order to make these projects economically viable.

Current Federal Highway Administration regulations, however, sharply restrict the use of and access to the rights-of-way to the

interstate highway system. These regulations are primarily interpretations of section 111 of title 23 U.S. Code, which prohibits the use of this right-of-way, including the air space above or below the highway, if such use would impair the full use or safety of the highway or otherwise interfere in any way with the free flow of traffic on the interstate system.

Therefore, as this subcommittee continues its hearings on the reauthorization of our Federal highway and transit programs, it is appropriate that we review existing law and regulations with regard to the construction of high-speed ground transportation systems.

The subcommittee will carefully weigh the benefits of allowing interstate right-of-way to be used for these systems in order to encourage their development against any adverse impacts on the interstate system, itself. We must not allow the development of these systems to endanger in any way the more than $120 billion which we have invested in our interstate.

Throughout Europe and Japan we have seen repeated examples of the success of high-speed ground transportation. Furthermore, the use of magnetic levitation technology in new systems promises even higher speeds at a lower level of energy consumption.

Clearly if we make these systems available to the American public and we do not diminish the free flow of existing traffic on our interstate system the potential exists for great increases in our national transportation capacity.

Again, I hope that these hearings will help us realize those kinds of potentials.

At this time I'd like to introduce my very fine colleague from Pennsylvania, Mr. Shuster.

Mr. SHUSTER. Thank you very much, Mr. Chairman.

Mr. Chairman, I think that this hearing today is very propitious because what we are considering here represents some very exciting transportation possibilities.

Since our National Transportation Policy Commission of the 1970s, I have tried to focus on the issue of high-speed rail, looking at everything from TransRapid Transit to the Bullet train in Japan and, indeed, several of the proposals here in the United States across these United States. I think it is safe to conclude that the technology is already here in one form or another for high-speed rail.

The fundamental question is a question of economic feasibility. While there are many success stories in Europe and Japan, those countries—the demographics, the geography — are very fundamentally different from the United States. So while I think we can learn a lot from those countries, we have to be very careful to recognize that we, indeed, are looking at a different scale and a different magnitude and different lifestyles.

With that in mind, it seems to me that it is going to boil down to the question of economic feasibility. I am very encouraged by the private groups which are expressing their interest in putting up the private dollars to support high-speed rail. That certainly is something that indicates seriousness and a belief that high-speed rail can succeed in the marketplace.

I look very much forward to these hearings today.

Thank you.

Mr. MINETA. Thank you very much.

Mr. Lipinski?

Mr. LIPINSKI. No statement.

Mr. MINETA. Mr. Packard?

Mr. PACKARD. Thank you, Mr. Chairman.

I certainly want to applaud your efforts in scheduling this very, very important hearing. I think you are aware that in California we are anticipating a high-speed Maglev system. This hearing will certainly give us a great deal of information as it relates to our efforts there, but also in other parts of the country. This is certainly going to be a wave of the future, I believe, in solving some of our congestion problems and commuting problems to and from airports and a variety of other population centers.

I am looking forward to the testimony.

You have brought up in your opening statement, Mr. Chairman, a very, very important issue, and that is: the only way that we can find high-speed rail in this country and Maglev systems in this country cost effective is to use existing rights-of-way. If the private companies have to buy new rights-of-way, it will be prohibitive and it will simply block any progress in this area. So we do have to find, in my judgment, a way to make available existing rights-of-way, make better use of those very expensive rights-of-way, and open the door for those to be used by the private sector.

I am looking forward to the testimony particularly of Mr. Arnhym, who comes from the system that is being anticipated in Southern California. I am certainly anxious that the committee have an opportunity to hear what is planned there, recognizing that that is a totally private sector enterprise with no Federal resources, but certainly they will have to have access to rights-of-way that will make it possible for a system to be built.

Again, I want to commend you, Mr. Chairman, and ranking member Mr. Shuster for your leadership in this hearing and in this area. I look forward to the testimony.

Thank you.

[Mr. Packard's prepared statement follows:]

STATEMENT OF THE HONORABLE
RONALD C. PACKARD
REPRESENTING THE 43RD DISTRICT OF CALIFORNIA
BEFORE THE SUBCOMMITTEE ON
SURFACE TRANSPORTATION
DEVELOPMENT OF HIGH SPEED
TRANSPORTATION CORRIDORS
MAY 3, 1990

MR. CHAIRMAN, I APPLAUD YOUR EFFORTS AND INSIGHT FOR SCHEDULING THIS MOST IMPORTANT HEARING ON HIGH SPEED TRANSPORTATION CORRIDORS.

HIGH SPEED TRANSPORTATION TECHNOLOGIES, THAT WERE DISCOVERED IN THIS COUNTRY SOME TWENTY YEARS AGO, ARE BEING DEVELOPED IN FAR AWAY LANDS BY OUR INTERNATIONAL ECONOMIC COMPETITORS. A PROPOSED MAGNETIC LEVITATION SYSTEM IN ORLANDO, FLORIDA WILL BE BUILT BY A WEST GERMAN COMPANY. AMERICAN COMPANIES, WITH THE INGENUITY AND MUCH OF THE TECHNOLOGY AT HAND, HAVE NOT EXPENDED A TREMENDOUS AMOUNT OF CAPITAL ON THIS TECHNOLOGY IN LARGE PART DUE TO A LACK OF COMMITMENT ON THE PART OF THE FEDERAL GOVERNMENT. THIS COMMITMENT NEED NOT COME ONLY IN THE FORM OF INCREASED FEDERAL EXPENDITURES, BUT IN OTHER WAYS AS I WILL EXPLAIN LATER.

DEVELOPMENT OF A HIGH SPEED TRANSPORTATION SYSTEM IN THIS COUNTRY WOULD HAVE FAR-REACHING AFFECTS. NOT ONLY COULD THIS TECHNOLOGY, WHETHER IT BE MAGNETIC LEVITATION OR HIGH SPEED RAIL, RELIEVE CONGESTION AT OUR AIRPORTS BUT COULD ALSO RELIEVE CONGESTION ON OUR HIGHWAYS, THAT IS, IF THE SYSTEM IS NOT COST-PROHIBITIVE. THIS TECHNOLOGY COULD DELIVER MILLIONS OF COMMUTERS TO THEIR DESTINATIONS EACH YEAR AT A GREAT RATE OF SPEED AND IN A MANNER THAT IS MUCH MORE ENVIRONMENTALLY SAFE THAN EITHER MOTOR VEHICLES OR AIRPLANES. DEVELOPMENT OF AN ENVIRONMENTALLY SAFE MODE OF TRANSPORTATION THAT WILL ALLEVIATE CONGESTION ON TWO SEPARATE MODES OF TRANSPORTATION WOULD SEEM TO BE TOO GOOD TO BE TRUE. CAN WE DO IT? CAN WE AS A NATION DEVELOP THIS NEW, INNOVATIVE SYSTEM? THE ANSWER IS YES. TO DO SO, HOWEVER, WOULD REQUIRE THAT WE ALLOW OUR NATIONAL ECONOMIC RESOURCES BE UNLEASHED. FREEING UP OUR RESOURCES, SUCH AS MAKING ACCESS TO EXISTING RIGHTS-OF-WAY AVAILABLE, WILL ALLOW THESE SYSTEMS TO OFFER COMPETITIVE PRICING. ACCESS OF EXISTING RIGHTS-OF-WAY OF OUR INTERSTATE HIGHWAY SYSTEM MUST BE MADE AVAILABLE TO THESE PURSUITS. WITHOUT USE OF OUR EXISTING RIGHTS-OF-WAY, HIGH SPEED TECHNOLOGY WOULD PROBABLY BE COST PROHIBITIVE AS A METHOD OF DAILY COMMUTER TRAVEL. THE TECHNOLOGY WOULD REMAIN A COST-EFFECTIVE ALTERNATIVE TO SHORT AIR TRAVEL, BUT THE OVERALL BENEFITS OF THE TECHNOLOGY WILL BE GREATLY REDUCED. IT IS TIME THAT WE UTILIZE OUR RESOURCES TO THEIR GREATEST EXTENT. AS I AM SURE YOU ARE AWARE, MR. CHAIRMAN, WE WILL

HEAR TESTIMONY LATER TODAY FROM MR. ROLFE ARNHYM, A COMMISSIONER OF THE CALIFORNIA-NEVADA SUPER SPEED GROUND TRANSPORTATION COMMISSION. THE COMMISSION PROPOSES TO LINK SEVERAL SOUTHERN CALIFORNIA CITIES WITH LAS VEGAS WITH NEW HIGH SPEED TRANSPORTATION TECHNOLOGY. THREE COMPANIES ALL NORTH AMERICAN (BECHTEL, MORRISON-KNUDSEN, AND BOMBARDIER) WILL COMPETE FOR THIS PROJECT. BY THE WAY, THIS PROJECT IS TO BE BUILT WITH PRIVATE CAPITAL. AS I UNDERSTAND IT, THE FACT THAT PRIVATE CAPITAL IS BEING USED MAY PREVENT THIS PROJECT FROM USING EXISTING RIGHTS-OF-WAY.

I AM CERTAIN THAT MR. ARNHYM, AS WELL AS OTHER WITNESSES, WILL HAVE LAUDATORY COMMENTS ABOUT THE PRESIDENT'S BUDGET REQUEST TO STEP UP OUR COMMITMENT TO RESEARCH AND DEVELOPMENT OF HIGH SPEED TECHNOLOGIES. BUT ONE COMMON VOICE WILL RING LOUDER AND MORE TRUE THAN THE OTHERS, "IF THE FEDERAL GOVERNMENT DOES NOTHING ELSE, PLEASE GRANT US ACCESS TO RIGHTS-OF-WAY ON INTERSTATES AND OTHER FEDERALLY ASSISTED HIGHWAYS." I WISH TO JOIN IN THIS CHORUS. I FIND IT LUDICROUS THAT THE FEDERAL GOVERNMENT WOULD DENY ACCESS OF RIGHTS-OF-WAY TO A PROJECT LIKE THE PROPOSED ONE IN SOUTHERN CALIFORNIA BECAUSE IT IS A COMMERCIAL ENTITY. THIS IS A PERFECT EXAMPLE OF THE FEDERAL GOVERNMENT NOT BEST UTILIZING AVAILABLE RESOURCES, IN THIS CASE THE FAILURE ON THE GOVERNMENT'S PART IS WITH BOTH PRIVATE AND PUBLIC RESOURCES.

THIS EXAMPLE, I THINK, SHEDS LIGHT ON A MUCH DEEPER PROBLEM WITHIN THE FEDERAL GOVERNMENT. IN THIS TIME OF SHRINKING FEDERAL BUDGETS, IT SHOULD BE PARAMOUNT WITHIN THE FEDERAL GOVERNMENT TO IDENTIFY AND UTILIZE ALL AVAILABLE RESOURCES. THE PRIVATE SECTOR CAN AND SHOULD PLAY A ROLE IN THIS. CURRENT GOVERNMENT PRACTICES, HOWEVER, PREVENT FULL UTILIZATION OF THIS NATION'S RESOURCES. THIS SIMPLY MAKES NO SENSE. THE FEDERAL GOVERNMENT SHOULD ENCOURAGE AND INCENTIVIZE PRIVATE SECTOR PARTICIPATION--NOT DISCOURAGE IT.

I COMMEND THE CHAIRMAN OF THE SUBCOMMITTEE, MY GOOD FRIEND, MR. MINETA AND THE RANKING MEMBER MR. SHUSTER FOR THEIR LEADERSHIP IN CALLING THIS HEARING. I LOOK FORWARD TO HEARING FROM TODAY'S WITNESSES AND AM ESPECIALLY INTERESTED IN HEARING TESTIMONY FROM ELAINE CHAO FROM THE DEPARTMENT OF TRANSPORTATION AND FROM ROLFE ARNHYM OF THE CALIFORNIA-NEVADA SUPER SPEED GROUND TRANSPORTATION COMMISSION. THANK YOU MR. CHAIRMAN.

Mr. MINETA. I want to thank the gentleman. As I recall from my past days in local government, you were very active on the subject matter on the city council there when they were considering the San Diego/Los Angeles high-speed system.

Mr. Costello?

Mr. COSTELLO. Mr. Chairman, I am looking forward to hearing the testimony of the witnesses today—in particular our colleague, Mr. Hayes. As a person who has been very active in local government and a supporter of light rail in the Saint Louis metropolitan area, I look forward to hearing the testimony on this very important issue.

Thank you.

Mr. MINETA. Mr. Hancock?

Mr. HANCOCK. I have no statement.

Mr. MINETA. Mr. Jones?

Mr. JONES. Mr. Chairman, I, too, would like to thank you for having these hearings.

I see in the list of States in which corridors are under active discussion is not included the State of Georgia. I'd like to see it added to that list because I believe that Maglev technology is vital to our future transportation needs, and this mixed use of current rights-of-way is a compelling proposal.

Thank you for having these hearings.

Mr. MINETA. Mr. Shuster?

Mr. SHUSTER. I'd like to ask unanimous consent that we enter in the record a statement by John Paul Hammerschmidt, the ranking member of the full committee.

Mr. MINETA. Without objection, so ordered.

[Mr. Hammerschmidt's prepared statement follows:]

STATEMENT BY THE HONORABLE JOHN PAUL HAMMERSCHMIDT

Thank you, Mr. Chairman.

I would like to commend you, Chairman Mineta, and our fine ranking Republican on the Surface Transportation Subcommittee, Bud Shuster, for scheduling this hearing on exciting new technologies which may be the wave of the future for transportation in America.

High speed ground transportation by way of steel wheel and magnetic levitation systems promise to revolutionize modes of travel between our major cities. There are potential benefits for energy efficiency, the environment and traffic congestion. It is time to bring our scientists, industry, and government together to see that this technology finds a home here in America, where it began.

Today we will focus on the use of the interstate rights-of-way as a potential location for construction of such systems. We want to ensure that our fine interstate system retains its excellent reputation for integrity and safety while, at the same time, accommodating a compatible parallel transportation system.

I look forward to hearing testimony from our impressive roster of witnesses. Thank you again, Mr. Chairman, for this timely and significant hearing.

Mr. MINETA. Mr. Cox?

Mr. Cox. I'd just like to welcome Congressman Hayes and thank him for his resolution, which I am delighted to support. And I welcome Deputy Secretary Chao and Doctor Danby also.

Mr. MINETA. Mr. Payne?

Mr. PAYNE. Mr. Chairman, thank you very much for holding this hearing.

As we, as a subcommittee, explore our Nation's transportation needs in order to reauthorize the Surface Transportation Act next

year, we should certainly be examining all possible aspects of improving transportation in this country.

The Administration's national transportation policy calls for renewing and strengthening our Nation's focus on technology and innovation to meet the expectation and needs of our Nation and to maintain our competitiveness in the world. I certainly agree with this policy and feel that today's hearing provides us an opportunity to examine such a means of accomplishing this goal.

I welcome all of the witnesses. I especially welcome our colleague from Louisiana, Mr. Hayes. I look forward to hearing their comments and ideas on potential development of high-speed transportation corridors.

Thank you, Mr. Chairman.

Mr. MINETA. And a member of our full committee—not a member of the subcommittee, but a member of the full committee who is sitting here with us today, someone who has been interested in this subject a long time, our colleague from Pennsylvania, Mr. Kolter.

Mr. KOLTER. Thank you, Mr. Chairman. I wish to thank you and the committee for bringing this most important topic out at this appropriate time because as we are talking, at this precise moment, very important meetings are being held on high-speed magnetic levitation at Embassy Row Hotel.

My interest in high-speed rail goes back many years ago. In fact, the very first piece of legislation I had signed into law by President Reagan was my High-Speed Rail Bill.

I actually call high-speed magnetic levitation the birth of a new industry, because back in Western Pennsylvania and Eastern Ohio where we have so much unemployment, we are talking about only in Pennsylvania perhaps 30,000 permanent, full-time jobs in our high-speed rail venture which will take us from Pittsburgh to Philadelphia, not counting the non-permanent jobs and the part-time jobs.

We look at high-speed rail not only as a change in our Pennsylvania economy, but as a people mover. You know, in Pittsburgh recently they announced a Corporation for Profit in which a number of corporate leaders have joined forces and pooled their resources to further high-speed rail in Pennsylvania. We're talking about regional transportation going from Pittsburgh east and going from Pittsburgh west to some of the rural districts. Just last week I believe the State Legislature had a bill brought out of the Transportation Committee, H.R. 2316, with 141 co-sponsors asking that the Pennsylvania Turnpike become involved in developing and implementing legislation for high-speed rail in Pennsylvania within one year.

So you see we are on the move here. Again, I thank you for the timeliness of your legislation, Mr. Chairman.

Mr. MINETA. Thank you very much.

We are very, very pleased to have our colleague from Louisiana, the author of H. Con. Res. 232, before us to start these discussions. At this time let me introduce and have the gentleman proceed.

TESTIMONY OF HON. JAMES A. HAYES, A REPRESENTATIVE IN CONGRESS FROM LOUISIANA

Mr. HAYES. Thank you very much, Mr. Chairman.

I would ask that the submission be placed in the record and the prepared testimony be made a permanent part of the record of this proceeding and would, instead, make the following observation.

There are occasions—rare occasions—when the issue at hand is of paramount importance and falls into the right guidance. This is an issue that involves advanced technology and could certainly use the expertise gained by someone who has served in science and technology, and it is an issue of mass transit, blending the need for someone who has got a background in transportation.

And, of course, you have days like today when you just have to deal with the chairman that fate has dealt you.

Therefore, returning to square one, I'd like to point out that, in a very personal manner, I need help on H. Con. Res. 232 because these two pages are actually the only typing my staff has been able to complete in the two terms that I have served here in Congress, making this the only imprint we have had in any form or phase of involvement with the Federal Government. For that reason it is very important that we have the concurrent resolution moved—to show the folks back home that they have, indeed, completed one assignment, if no others.

The State of Louisiana, as you may imagine, is not the hotbed of Maglev technology. It would probably take more of a marsh-buggy at high speeds to move transportation across the portion of the State of Louisiana that I represent. And I make that point only to establish a credibility to my sincerity in pursuing this issue.

Since I have been here and seen the workings of government and the needs of the Nation at a first-hand level it has become abundantly clear that we are not doing a very good job in transferring technology to the marketplace.

We are being outdealt by our foreign competitors— especially West Germany and Japan—at understanding the economic consequences of research technology.

In the 1960s American ingenuity created the concept of Maglev. In 1970 we were funded substantially by the Federal Government, and the strides that were made and improvements that were made put us in the supreme position to go forward. So in 1975 we did just the reverse—we ended Federal funding and we handed to our competitors, gift-wrapped, the opportunity to move into the marketplace. With an investment of $1 billion in Japan and almost half that much in West Germany, those two countries have, in fact, prepared the entrance into the marketplace. But here is an opportunity that American business has to leapfrog the technology we began past the research dollars put in by competitors and take it directly to those major cities and those corridors which can most use rapid transportation.

In addition, this is an opportunity that our Nation has to help those people who get so overlooked in so many political forums: the people who are struggling to be first-time home purchasers and who realize that the inner core cities where they have employment are simply not affordable for them; people who want an opportuni-

ty to raise families with a little bit of room for the children to walk around and put a swing in the back yard, but realize that the commuting distance makes it impossible for them to retain their employment.

But if you can move at 300-plus miles an hour you can ease the housing burden in major cities; you can ease, you can save almost $30 billion a year lost in fuel consumption, alone, that is unnecessary; and you can make affordable housing and development of things that—Mr. Payne has already experienced it in Virginia—spread out around the corridors with the major employment centers as hubs.

I think for that reason the State of Louisiana, which will not be an instant recipient of this technology, is the recipient of the important national goals and accomplishments that would be made.

This is an area where in trade deficit, alone, we have gone to having a share of the market that looked more like 30 percent down to 21 percent, while the Japanese have grown from 7 to 20. This isn't a high-tech issue in terms of percentage. About 5 percent of this project is high-tech, but it is the 5 percent that makes the difference and the total investment as far as advancing both the quality of life and the ability of our country to be part of the global marketplace. It is the crucial 5 percent, without which the other 95 percent is meaningless.

We stood by. We watched technological breakthroughs in other parts of the world that have dominated our aircraft market. We are watching turn-arounds dramatically with the semiconductor industry. We have the scientists that developed superconductivity faster and better than anyone else in the course of mankind, and I'd hate to think of us sitting around and watching their technology turn into the gross national product of our competitors.

That's the statement that I have to make, and I would appreciate very much the chairman's attention to H. Con. Res. 232 as a statement on behalf of the Congress and a feeling that this is an area where in a long overdue absence of America recognizing the potential in the marketplace for superiority and technology and the advancement of the living conditions of the vast majority of our people, that we are prepared to commit the Federal dollars to move forward.

Thank you, Mr. Chairman.

Mr. MINETA. Thank you very much. Your full statement will be made a part of the record.

Mr. Hayes, in your opinion——

Mr. HAYES. I don't do questions, Mr. Chairman. [Laughter.]

Mr. MINETA. I thought I'd have an opportunity to get even with—I mean, not get even with you, but to have an opportunity to ask some questions.

Mr. Hayes, in terms of trying to proceed at the national level to gather support for magnetic levitation technology, how do you think we ought to really be nurturing this discussion at the national level so that we get some momentum on this?

Mr. HAYES. I think that we should touch those things that are a part of everyone's daily lives. The time that is lost in commuting is time that is not productive, for the most part, toward any kind of economic base. Secondly, it is time spent away from work and time

spent away from family. I think that we can stress, as well, the family values in talking about skyrocketing housing costs. Here is an opportunity where we can enrich the lives of those people who are working people and who are spending entirely too much time going to and from or who are having to live in substandard housing because they cannot get affordable housing near enough to their work place to be able to cut down on the time lost.

Here is an opportunity to make a national priority the excellence of the program, itself, and show the impact on daily lives where tax dollars spent by people are returned to them directly. And, at the same time, as a Nation our GNP increases and our balance of trade can significantly decline the unfavorable balance if we are able to target these research dollars and place them in the marketplace.

Mr. MINETA. And does this research effort, whatever it might be, put us in the position of having to, from a Federal perspective, pick winners and losers as to what kind of technology is involved—magnetic levitation technology over other kinds of technology relating to high-speed ground transportation?

Mr. HAYES. I think obviously not. I think what we are doing is putting those competitors into a marketplace. Certainly there will be numerous companies that with interrelationship of their own business interest will be competitive one to the other, but the big winners of that competition are the citizens of the country. Whatever happens, whichever company is most successful in demonstrating the practicability of their research and their design techniques, it is going to advance the Nation.

It is much like the original railroad competition moving from east to west. The point as to who got farthest had financial rewards, but the Nation benefited in creating the transit that was trans-continental and developing the opportunity to go into the West and enlarge the economy there.

Likewise, we are able to create Heaven knows how much economic development in smaller areas surrounding major metropolitan cities, easing both congestion burdens and creating construction opportunities in areas that now simply are not practical to do so.

Mr. MINETA. Have you given any thought as to how much maybe in the next five years we are going to have to come up with to advance this technology?

Mr. HAYES. I am not certain. I'm sure you have witnesses that follow that could give you a better investment effort. But I can tell you what we have come up with in the last five years by not doing it. By not doing it we have ended up losing, just in trade deficit, alone, well at $100 billion, and we are looking, as I said, at $27 billion a year that we lose. And the environmental impact, which I did not dwell upon in my opening statement—here is an area where environmentalists can be so concerned in moving forward technology and, at the same time, by cleaning the air from those congested vehicles that aren't moving but yet moving gasoline and emitting fumes, and moving the ability to put resources toward projects that have long been neglected in smokestack areas by having emission standards made even higher by moving to Maglev.

I mention, too, when we talk about investment, this is the cheapest per-mile maintenance that will exist for many years to come in transit. I'm sure you will have experts who can talk about that. But the per-mile maintenance of the Maglev technology in train systems that could be built is just unbelievable in comparison to current maintenance of highways or current maintenance of rail service.

Mr. MINETA. Thank you very much.

Mr. Shuster?

Mr. SHUSTER. Thank you, Mr. Chairman.

Mr. Hayes, we very much appreciate your testimony.

One of the areas that you touched upon and I need to get a little more clear in my mind is when you talked about families needing affordable housing and they can move out a little further if they have high-speed rail. One of the problems—the advantage of high-speed rail is that it is fast, and the fact that it is very fast means that it isn't going to work well in urban areas. It is an inter-city transportation mode more than an urban mode. How would you see that benefitting homeowners?

Mr. HAYES. When you take a State like California, the ability to imagine that you could increase the diameter of the circle from which those who were employed in major cities like Los Angeles and take them out further into undeveloped areas of California with the opportunity to do home construction in areas where it currently cannot exist and does not have a local economy to support it, and yet through high-speed allow those people to be able to be the equivalent of the commuters that live within a much shorter distance to metropolitan areas.

In addition, I think it becomes very possible to move corridors such as Boston-to-Washington and corridors such as Los Angeles into the desert, into Las Vegas, or Los Angeles/San Francisco, which makes a relieved burden on both air traffic that is over-congested and a relieved burden in other forms of transportation that is tremendously needed in the California area.

But I think you will see communities spring up that become hubs that are just the right distance to be able to make commuting times reasonable and yet be in areas where real estate markets have not been previously developed so housing is not skyrocketing, as we experienced in parts of Northern Virginia with using the Metro system, for example.

Mr. SHUSTER. Thank you very much.

Mr. MINETA. Mr. Costello?

Mr. COSTELLO. No questions.

Mr. MINETA. Mr. Packard?

Mr. PACKARD. No questions.

Mr. MINETA. Mr. Jones?

Mr. JONES. I appreciate your testimony.

Do you see this technology—we're talking about commuting now, and I visualize that, too. We live in a city which has a 50- to 60-, and sometimes even 70-mile radius of commuters who would be cutting their commuting time to perhaps one-fourth of what it is with such a train, even making stops. Environmentally it is very positive.

My question is about—to change the subject slightly, because we had some hearings recently and we all were made aware of the new tilt rotor aircraft technology. Do you see this emerging technology as a complement or perhaps competition to solving some of our transportation needs?

Mr. HAYES. I think it is complementary. I don't think there is any question but that rail travel in the United States, for example, was heavily complemented by the building of an interstate system. There will always be competition—the price of moving freight between one alternative and another. Truckers will always be in competition with railroads, and the best deal and a few cents cheaper per pound will always make the economic difference.

But as far as not being complementary and recognizing that having both systems working towards the lowest possible price for commercial users, you can throw in tilt rotor or any other air traffic and throw in any other form of competition and it will be the consumer who benefits most, and it will be the necessity of having alternative choices.

But in some areas it is clear to me that Maglev will dominate. If we are talking about the means of moving larger numbers of people along a long-distance corridor—as you have in parts of California, Florida, and the east coast—then this technology becomes the most practicable and far and away the least costly because of maintenance costs.

In our State of Louisiana—and I know Georgia is a Southern State, but maybe not the same soil conditions, but you probably have near figures. In our State of Louisiana building the highway is not the cost; maintaining it is the huge cost for us across so many areas. If you can cut that maintenance down, and you're talking then about both forms—longer-term traffic that would compete with air fair—or you are talking about commuter costs—looking at automobiles and cost of building highways—I think without any doubt the Maglev technology is one that will improve both areas and certainly not do away with competition, but will make it very possible to remove congestion.

I wish we were talking just about competition, but, as you know, at the Atlanta Airport and in New Orleans and even parts of my district that don't have large cities, congestion is beginning to become our enemy and is stalling our economies in areas that otherwise might be able to have more vitality.

Mr. JONES. I agree with you. I think what we need to more clearly evolve is a visionary intermodal system which involves all of these new technologies and would alleviate highway and airport congestion, and that they would ultimately complement each other.

Thank you, Jim.

Mr. HAYES. Thank you.

Mr. MINETA. Mr. Payne?

Mr. PAYNE. No questions.

Mr. MINETA. Mr. Kolter?

Mr. KOLTER. Thank you, Mr. Chairman.

I want to say that I share Mr. Hayes' assessment of high-speed rail. The losses we have are unreconcilable. But, you know, high-speed rail was really developed by a Frenchman in America in 1912 and was sold to Japan, who further advanced high-speed rail

and sold it to Germany. So the losses that we have here are just unbelievable.

We are talking about whether or not high-speed rail would be rural or just inter-city. In Pennsylvania the High-Speed Rail Maglev Corporation for Profit's planning stops in rural districts. For example, from Pittsburgh to Youngstown will have two stops in my district in Beaver County, one in Aliquippa, and one in New Castle. So we are talking regional transportation. I envision jobs after jobs after jobs because at every stop you will have a city within a city, like we have here in our subway system.

I thank you for your testimony, Mr. Hayes.

Mr. HAYES. Thank you very much.

Mr. MINETA. Mr. Hayes, thank you very much.

Mr. HAYES. Thank you for your invitation.

Mr. MINETA. It was against better advice to have you here, but I consented.

Mr. HAYES. Well, I knew I was invited because you have long said, Mr. Chairman, that if I was in this room not to be anywhere near you. I took that as an invitation to be a witness.

[Laughter.]

Mr. MINETA. It was good to have you at the meeting prior to this that kept us late.

[Mr. Hayes' prepared statement follows:]

STATEMENT OF CONGRESSMAN JIMMY HAYES

Mr. Chairman, I appreciate this opportunity to speak before the Subcommittee on Surface Transportation on the issue of magnetically levitated transport systems. I appear before this committee today as a member with a strong interest in developing MAGLEV systems in order to unleash the many benefits MAGLEV will have for our country.

As each of us sits in the now infamous traffic jams of Washington, I am confident that we all are thinking about the same thing; something must be done to improve our ability to move throughout our communities, whether it is going to work, school or out of general errands.

As the cost of continual delays on highways and in airports approaches $27 billion per year it is easy to understand the need for getting America moving. The additional hours on the road and in the air not only costs us money in terms of lost man hours and spent fuel, but also adds to environmental problems incurred by more buses, trucks, planes and cars burning more fuel. Fortunately, MAGLEV offers us with an exciting way to address each of these concerns.

A MAGLEV system will be able to move large numbers of commuters off of the roads and into transports traveling at 300 mile per hour though our communities while drawing upon one, single source of energy; a regular power plant. Imagine the impact on traffic congestion and our environment if we would take thousands of cars off the road. The debates surrounding the Clean Air Act would be substantially different as mobile sources would no longer place such a heavy burden on the clean air of communities such as Washington.

However, I will leave the comments on the environmental and transportation aspects of MAGLEV to the real experts that will follow me here today. I would rather take the time to discuss the competitiveness angle of the proposed transport system.

The MAGLEV story repeats an all-too familiar tale of American ingenuity being translated into action by foreign governments and businesses. During the mid-1960's the U.S. pioneered the invention and development of the practical superconducting MAGLEV. With the support of the federal government we took the lead in this science with the mandate to deliver an alternative transportation system to a country expecting a critical bottle-neck in its transport system. However, in 1975, the federal commitment ended.

At that point we relinquished our lead as the West Germans and Japanese went forward, based upon our primary work, in providing a firm commitment to advance the concept. Since that time, the Japanese have spent over $1 billion to develop a full-sized test vehicle, able to travel at speeds of 320 m.p.h. and is actually carrying

people in mock runs. The West Germans have spent roughly half that figure to develop their test model and have run their vehicle for over 100,000 miles.

While all these models are operating, these countries are accumulating incredibly important information on the practical applications and production of superconductive materials. We have an opportunity, however, to leap-frog our competitors for once.

As you listen to the experts here today you will appreciate that fact that we are now faced with our last window of opportunity in the MAGLEV field. We are rapidly approaching a point of no return, where all the benefits from developing such a high-tech system will be lost. As you may know, we are currently faced with the real prospect that we will once again be reduced to buying a U.S.-inspired technology "off-the-shelf" of our competitors much the same way we now buy Sony TVs and German cars.

What concerns lie in this fact for us? Remember that we weren't concerned for the far-reaching implications of the loss of the color television industry in this country, but we now recognize the damage that loss has had in many fields. The loss of the accompanying semi-conductor industry now impacts not only televisions, but critically impact our defense system, computer industries, and many other industries. I hope that we will not repeat that mistake with MAGLEV.

While only 5% of the entire construction cost of a MAGLEV is "high-tech," it is that vital 5% for which we must be most concerned. Just as with the television industry, this small portion is the heart and soul of the project. Should we be able to build an expertise in superconducting materials and provide a large market for the materials, we would be able to use them in applications that we currently are only able to talk about.

America's share of the world's exports of technologically-advanced goods continues to decline. In 1986, our percentage of this world trade fell to 21%, after holding at nearly 30% during the mid-60's. During that same period of time, the Japanese percentage moved in a reverse direction, from 7% to 20%.

We have to understand why these changes have, and continue, to occur in our industrial sector and we must respond with conviction. I believe that the federal government must work in an active partnership with industry to utilize this window of opportunity to finally leap-frog our competitors prior to their successful commercialization of this technology. Industry has already begun to put their time and money on the table, it is time for Congress to respond.

Mr. MINETA. At this time I'd like to call forward the very capable Deputy Secretary of Transportation, the Honorable Elaine L. Chao, to come to the witness table.

As I understand it, she is going to be accompanied by Dean Carlson, the Executive Director of the Federal Highway Administration.

Secretary Chao, your statement will be made a part of the record. Please proceed in your own fashion.

TESTIMONY OF HON. ELAINE L. CHAO, DEPUTY SECRETARY, U.S. DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY DEAN CARLSON, EXECUTIVE DIRECTOR, FEDERAL HIGHWAY ADMINISTRATION

Ms. CHAO. Thank you, Mr. Chairman.

I do have a statement for the record. I'd like to summarize it through a brief opening remark. I'll be glad afterward to answer your questions.

It really is a pleasure for me, Mr. Chairman and distinguished members of the committee, to appear this morning on behalf of the Department of Transportation on what we view as one of the most exciting developments in transportation in recent years, and that is magnetically levitated high-speed ground transportation, or Maglev.

There is a great deal of interest in this technology, and the Department is pleased to take a leadership role in its development.

Just yesterday I delivered the keynote speech at a government/industry-sponsored Maglev forum, which brought together a broad range of individuals to discuss issues associated with the development of Maglev systems in this country. The participants ranged from Members of Congress to some of our largest businesses, companies interested in developing Maglev systems, to many of the scientists and engineers who were actually involved in the early development of Maglev technology, as well as many others who will participate in making Maglev work in this country.

Clearly congestion on our highways and at airports is on many of our minds these days. Congestion is constraining mobility such that our economic growth as a Nation may potentially be adversely affected.

If Maglev lives up to its potential, we believe that it offers one option for dramatically improving surface transportation mobility using a technology that is energy efficient and also environmentally sound.

Both Secretary Skinner and I have visited Emsland, West Germany, to test ride the prototype TransRapid Maglev and also met with its designers. I have also met with the designers of the Japanese Railway's prototype, and also with State and local officials and private investors who want to develop Maglev systems within the U.S.

I came away from these meetings believing that this technology does have the potential to play an important role in the Nation's transportation system.

As the agency responsible for the safety of Maglev systems, DOT has initiated a major research effort to ensure the safety of U.S. Maglev systems. We are working with the developers of the system to ensure that safety standards and regulations are clear and that they are timely, so that they may be considered early on in the system design. What we want to do is to ensure that safety is built into the system early and not added on later.

At the direction of Congress' Appropriations Committee, FRA is studying the feasibility of commercial Maglev in the U.S. That study will be finished in June of this year and will evaluate Maglev market potential, assess the economic and technological feasibility of commercial Maglev systems, and also identify legislative and other institutional changes that would facilitate the development of U.S. design and manufacture of Maglev systems.

Now, for this and other related Maglev work we have assembled a core group of scientists and engineers, including some of those who were involved in early Maglev research early on in this country.

As you are aware, the President's budget request for fiscal year 1991 does include a request for approximately $10 million to explore the possibility of stepped up U.S. efforts in Maglev. Building on previous research and development done by the Department, and also results of the current feasibility study, our program is designed to determine whether Maglev indeed has a role to play in the U.S. transportation system, the economic feasibility, the appropriate safety and operating standards, and also the remaining technologies that have got to be developed to achieve an efficient and also environmentally sound system.

The goal is to facilitate private development of an operational Maglev system in the States.

Now, to avoid possible duplication, and also to combine efforts, Federal agencies with interests in Maglev have established a mechanism to coordinate our efforts. The Federal Maglev Executive Committee, chaired by Federal Railroad Administrator Gil Carmichael, with Major General Patrick Kelly of the Army Corps of Engineers, and J. Michael Davis, Assistant Secretary for Conservation at the Energy Department, will set policy for this effort. We are calling it the Federal Maglev Initiative. Other DOT modal administrators and other Federal agencies are also represented at the policy level.

At the working level, the Federal Maglev Coordinating Committee is directing implementation of this policy and coordinating all the Federal Maglev efforts.

I think the process is going well, and I believe that the addition of the Corps of Engineers' expertise in civil works to the Department's expertise in transportation and in developing this technology initially will lead to definitive analysis and recommendations on the future of Maglev in the States. These recommendations are to be completed in early 1992, and they will lay out the potential for Maglev and also the steps which the Federal Government and the private sector will have to take to realize its potential.

The group's first effort and joint endeavor is this government/industry forum that I just mentioned. This forum explains the Federal Maglev Initiative, is soliciting private sector input, and is beginning to develop the government/industry relationship that will be necessary if this effort is going to be a success.

So I think Maglev systems offer an infrastructure alternative to new airports and new highways. It is an alternative with exciting possibilities. The Department is committed to seriously evaluating the potential of Maglev, and also to removing any regulatory or institutional barriers to its development.

Mr. Chairman, thank you for your patience. I'll be glad to answer any questions that you or the subcommittee may have.

Mr. MINETA. Thank you very much, Secretary Chao, for your very complete and fine statement.

I assume that this government/industry forum you mentioned here on page ten is the one that you addressed yesterday; is that correct?

Ms. CHAO. Yes. That is correct, sir.

Mr. MINETA. In your written testimony you state that the Maglev Executive Committee has helped foster inter-agency cooperation in Maglev research and development. Is there a further need to establish a new modal administration within the Department of Transportation to monitor and fund the development and construction of magnetically levitated high-speed transportation systems, as has been proposed?

Ms. CHAO. Mr. Chairman, as you know, President Bush and Secretary Skinner released the national transportation policy on March 8 of this year. This was a one-year effort which took a great deal of work on the part of the Department.

One of the major themes in the national transportation policy is the need to coordinate transportation planning on an inter-modal

basis. This is a theme again that Secretary Skinner has emphasized repeatedly during his first year in office.

We believe that creation of a separate modal administration at this point works against the goal of intermodalism. In the past, the Department has had a number of modal administrations which have tended to only consider their particular points of view.

As we have seen, building a new airport entails building not only the airport but also requires coordination from the Federal Highway Administration to ensure that the surface roads leading up to the airport are, indeed, able to carry the projected passenger load that the airport projects.

So there really is a much greater need for coordinated intermodalism. We are, again, trying to foster that also with this Federal Maglev Executive Committee. It is, I think, the first time that it has been done within the Department, and it is a committee that includes all the top managers of the Department, including Gil Carmichael, the Federal Railroad Administrator; Jeff Shane, the Assistant Secretary for Policy; Brian Clymer, the UMTA administrator; Federal Highways Administrator, Tom Larson; and also Admiral Busey of the FAA.

Mr. MINETA. Madam Secretary, the President did propose a funding level of approximately $10 million—$6 million for the Department of Transportation and $4 million for the Army Corps of Engineers—for research and development as it relates to Maglev. How will DOT allocate these monies?

Ms. CHAO. As of now the only allocation that has been set is the $1 million for FRA safety-related expenditures. The rest of the money—it is, as you mentioned, $6.15 million for FRA and about $3.5 million for the Corps of Engineers—is going to be the subject of the Task Force effort between the Army Corps of Engineers and FRA, as to how best to use that money.

Mr. MINETA. And as you look down the road, let's say over the next five years, how much money do you think will be required to continue this R & D effort?

Ms. CHAO. I think at this point it is a little premature to comment about funding for five years. Obviously this current $10 million study that we have now underway, which is due in 1992, will give us a much larger picture as to how, indeed, we want to proceed with this.

There are a lot of questions that need to be resolved on implementation of a Maglev system before we start talking about actual funding for implementation.

Mr. MINETA. Now, the rights-of-way of Federal Aid highways, including the interstate system, are actually owned, operated, and maintained by the various States, although the Department of Transportation has in place extensive regulations governing the shared use of these rights-of-way. It is my understanding that after a State approves a high-speed proposal it will then ask for the Department of Transportation's approval.

Is there right now any idea as to how the Department of Transportation does plan to evaluate the impacts on highway safety of these kinds of State requests for sharing highway rights-of-way with high-speed transportation projects?

Ms. CHAO. There are a number of actual projects throughout the country now. There is one in Florida. There is also one in Houston/Dallas. Certainly, as the Congressman mentioned, in Pennsylvania and California—there is also Anaheim to Las Vegas. I expect the government obviously will evaluate each project on a case-by-case basis.

As for the issue about rights-of-way, that is an issue that Federal Highways feels very strongly about that the agency would not want preemption of the State's authority as to what to do with the rights-of-way, and I don't think that we would do that. We will work with the States.

Mr. MINETA. As Executive Director, Mr. Carlson, do you have any further comments you might want to make?

Mr. CARLSON. Only that working with AASHTO, the Association of American State Highway and Transportation Officials, there is a policy for the accommodation of facilities such as Maglev, and we would work with them in seeing that accommodation is done in accordance with those policies.

Mr. MINETA. Do you believe that any additional Federal legislation is needed to help your department in this regard?

Ms. CHAO. We are aware of a number of proposed bills that are already in the hopper on this particular issue. I think there is a great deal of interest in developing Maglev. We in the Department are certainly very interested in pursuing some of these things. I think we are just going to have to proceed on a case-by-case basis as we go forward.

As of now we don't see any real need for further legislation. I think the process is going along well within the Executive Branch. The Department is taking the leadership role, and we don't really see a need at this point.

Mr. MINETA. Thank you.

Mr. Shuster?

Mr. SHUSTER. Thank you very much. We certainly appreciate your testimony today.

As you know, there have been many false starts over the past decade or so with regard to high-speed rail. In Pennsylvania we had a High-Speed Rail Commission. Ohio had one. We had the proposal for the San Diego to L.A., which never got rolling or levitating. I think it is very important that we don't go off half-cocked on this.

Ms. CHAO. Yes.

Mr. SHUSTER. And so I am pleased to see that you are emphasizing the importance of careful research.

Ms. CHAO. Absolutely.

Mr. SHUSTER. And that you are making sure we know what we are doing. We'd all like to see your mid-1992 recommendations tomorrow, but we also recognize we could end up being in the stew if that were to happen.

There are so many issues—not only the very, very fundamental one of economic feasibility, but the safety issue, the right-of-way issue that has been touched upon. One of the issues is how we handle the public versus private. I'd be interested in your comments.

We have, for example, in the Western Pennsylvania proposal in which I am greatly interested, a private, for-profit corporation. How do you envision our providing the right-of-way? Let's assume that the safety issue is handled and it is a safe thing to do. And let's assume that it doesn't create problems for the highways that are there. How do we give a right-of-way to public property to a corporation which is going to proceed to make profit from that public property? Do we lease it for a certain fee? Do we simply give them the right? How do we do this?

Ms. CHAO. I think your question is an excellent one. I'm not sure that I've got the total answer for you at this point. Obviously the rights-of-way are very important to the project.

Some people say that the right-of-way that is required for Maglev is really minimal because the tracks would be elevated and supported by little "footprints" that would not take up too much of the rights-of-way. But obviously in the major urban areas where we are experiencing congestion, there are only a limited amount of rights-of-way. Of those that are available, the land they occupy is very, very expensive. Also, many of the rights-of-way in the highly-congested areas involve curvatures. Again, that is not conducive to Maglev.

So there are a number of operational issues with rights-of-way.

As to your particular point about a State's rights-of-way as how a government "hands it over," I think that is a question that we have to study. I'm not sure we know the answer at this point. States own the rights-of-way. It has never been the Federal Government's role to preempt that.

Mr. SHUSTER. How do you feel about the fundamental issue of public versus private development of high-speed rail? On the one hand, the Western Pennsylvania proposal and others are saying it is going to be private. One could argue that, just as urban mass transit is public, that high-speed rail should be regional high-speed transit and developed and funded by Federal, State, and local taxpayer dollars. Where do you come down on that issue?

Ms. CHAO. I think this current debate about high-speed rail actually is very healthy because until there is a grassroots groundswell for high-speed rail or Maglev options, we are not even players in the funding debate. And I think all this general activity and interest in Maglev is elevating the issue again to the national level where we will begin to consider this as another option in the national debate about funding for transportation.

Obviously in the budget considerations that we have going forward, full Federal funding at this point is, again, a little premature to talk about. As you know, the Department's budget is about 75 percent funded by user fees. I would have to think that as we go forward, given the current budgetary considerations, and in spite of all of our enthusiasm in this technology, that the private sector is going to have to get involved and that user fees will also have to be employed.

Mr. SHUSTER. One final point. Perhaps I am overly concerned—and I'd appreciate your comment—overly concerned perhaps about the—when we start to compare the United States to Japan or to a European country when the demographics are so fundamentally different; when the distances are so short in those countries com-

pared to the massive distances we have in the United States; when our affluence and our lifestyles are such. All of these are such fundamental differences. We seem to simplistically say, "Well, Japan can do it and West Germany can do it. Why can't we do it? Look what they've done. Why haven't we done it?" And there are good reasons why we haven't done it.

Would you disagree with what I am saying?

Ms. CHAO. No, I would agree with you totally on that. There are different national priorities. Japan and Germany spent about $1 billion each, I understand, on their system. And then their demographics are different, the patterns are different. Rail, as you know, is a much more popular option in Western Europe.

Mr. SHUSTER. Thank you very much.

Mr. MINETA. Thank you very much, Mr. Shuster.

At this time we have a call of the House, and so the subcommittee will stand in recess for 15 minutes.

[Recess.]

Mr. MINETA. The subcommittee will please come to order.

Mr. Packard, it is your time. Please go ahead.

Mr. PACKARD. Thank you, Mr. Chairman. It is a pleasure.

I think you have recognized from some of the questions thus far, Ms. Chao, that there are major concerns about the use of existing rights-of-way—in my opening statement I mentioned that, as did the Chairman. If the private sector is to successfully venture out in Maglev or even high-speed rail we certainly are going to have to find a way to utilize existing rights-of-way; otherwise, it becomes cost prohibitive. Plus, in inner city and urban areas there simply are not additional rights-of-way available if they don't use existing rights-of-way, in my judgment.

And so the question again centers on that area. What changes will need to be made at the Federal and State level to permit that to happen? And is that doable, in your judgment?

Ms. CHAO. I was just told by my staff recently that, in fact, there are Federal statutes which prohibit the turning over of——

Mr. PACKARD. There is. There is current law that does not allow that. That would have to be changed.

Ms. CHAO. That's right.

Mr. PACKARD. I believe that's a Congressional——

Ms. CHAO. That obviously has to be changed. And then, even so, you will have to deal with the State and local authorities, as well.

Mr. PACKARD. But in your judgment is that doable? Can we make those alterations that would permit that to happen, or is that an alley that is not going to be made available, a blind alley?

Ms. CHAO. In terms of turning over rights-of-way?

Mr. PACKARD. Yes. In terms of using existing rights-of-way for Maglev.

Ms. CHAO. I think, again, that is one of the issues that we are going to consider in our overall study. There is also a great deal of talk about using rights-of-way for additional highway lanes, for example.

A decision has to be made at some point as to which right-of-way, how much, what it is to be used for. I think that all would be part of the analysis.

There are some regulatory and statutory considerations, one of which you mentioned. I think that is not a decision for us to make, actually, but actually for you in Congress.

Mr. PACKARD. Is it possible, in your judgment, if those roadblocks can be cleared, that there could be a fast-tracking of environmental impact reports? There have already been environmental impact reviews on existing freeways and rights-of-way that are now in use. Maglev, as you have already mentioned in your testimony, would not create a great deal of noise and perhaps would not be of any significant environmental impact.

Would there be ways to either get a State or a national environmental policy that would relate to such additional systems that would make it possible to avoid long-term delays, or even—well, you understand the thrust of my question.

Ms. CHAO. Yes, I do. At this point, my inclination would be that there is a well-defined set of regulations already in place for evaluating public works projects.

I think we should think long and hard about whether we want to construct a different set of criteria for a special kind of technology and whether by doing so, by segregating a special technology and putting forth its own criteria, whether it will match with those that are already required or whether it would instead be an additional layer of bureaucratic obstacles rather than the facilitating factors that we see.

Mr. PACKARD. I think that the enemy to progress in this new technology—in developing a national plan or strategy for Maglev I think delay is going to be a major problem for private enterprise. I foresee that it is going to be some time before the Federal Government comes up with policies that address private sector/public sector joint use of rights-of-way and other facilities that would allow it to move forward, and the environmental issues, impact statements, etc.

I think that delays—I see where there are systems already looking at 1992 and 1993 to actually start construction. I'm not sure, in listening to your testimony and seeing some of the fundamental problems that exist in terms of joint usage and new laws that might be required and State policies, whether—I foresee where delay could become a very significant impediment to moving forward, and thus costs go up if we are looking at the private sector doing a lot of this kind of work.

That also invites foreign competition to move in when our own domestic industry may not be able to, for a variety of reasons, and these delays may not be able to actually gear up to produce and be ready for an industry here in this country that would move forward. Do you see that delays could become a serious problem because of national policy problems?

Ms. CHAO. I'm very sympathetic to the issues that you just raised because I believe very strongly that the government's role is to facilitate and not to obstruct in terms of regulations. That is why I think the FRA has been working so hard on this issue. They know very well that, being the agency responsible for safety of these systems, it behooves everyone involved in the project to know ahead of time what the Federal requirements are for safety, what the Federal requirements are for further regulations. Those requirements

should be made very clear and very understandable to the parties involved at a very early stage so that the government requirements are consistent over the life of the project and, again, they are clearly understood and the participants in the project can have some certainty in their planning.

In terms of the delay, I am again very sympathetic about the delays because I think for enthusiasts of high-speed rail there is a real desire to get this project moving. And I think, from our point of view, we are certainly supportive of investigating and promoting Maglev and high-speed rail. But I don't think it is the role of the Federal Government to get ahead of the private marketplace, either.

As I mentioned earlier, I think it is very healthy that we are having these discussions right now because, just within the one year that I have been at DOT, I have seen a resurgence of a discussion and real active consideration of what the obstacles are to high-speed rail, how we facilitate it, what the realistic goals are, and what realistic things we can be doing to promote it are.

This is now the debate. We need that debate because there are some concerns and issues, like the rights-of-way, that we need to surface.

So I think the process is going along quite well. We have made a great deal of progress within the last year.

We've got the Florida High Speed Rail Commission that is underway. Last October, 1989, the Florida High Speed Rail selected the Florida High Speed Rail Corporation to proceed with detailed planning for a high-speed rail line serving Miami, Orlando, and Tampa. And on December 4 of last year the corporation presented the governor with a $650,000 check for local governments to use in their assessment of their application. More detailed submissions will be presented before final award of the franchise.

I think in "Las Vegas to Los Angeles" they are also contemplating this RFP process, and they are going ahead with that.

I think, actually, it is to the credit of these individual commissions that they have put such momentum and emphasis behind their projects, and I think they are succeeding.

If I can also add one more thing on the right-of-way issue, I would ask Dean Carlson if he has any additional clarification.

Mr. CARLSON. Only that we do have a situation existing where the States do own the right-of-way. I don't envision many States that have a strong interest in the technology that would not be able to work out some accommodation if it can be done safely.

We would look to Congress to change the legislation we now operate under, which requires a payment for the use of that right-of-way by a commercial interest.

Mr. PACKARD. And you feel that your agency would be cooperative in developing such language and such legislation that would make it compatible to the private sector moving forward?

Mr. CARLSON. At the direction of Congress, we would do that. Yes.

Mr. PACKARD. Thank you.

Thank you, Mr. Chairman. I appreciate it.

Mr. MINETA. Mr. Pallone, do you have any questions?

Mr. PALLONE. No, sir.

Mr. MINETA. Mr. Cox?

Mr. COX. I'd like to join the chairman in adding my kudos for our witness, whom I have had the opportunity to work with in the past, and whom all of us are fortunate to have at the helm (or near helm) of the Department of Transportation.

I'd like to follow up on the comments and conversation with my colleague from California, Congressman Packard.

We are going to be looking at the feasibility of Maglev in America and, of course, worldwide. We are going to be spending something like $9.7 million on it. Is it possible that in the course of doing this looking, we can invest in an analysis of how to get some of the regulatory roadblocks removed, how to change the railroad statutes, how to provide incentives for private investment?

It seems to me that, given the other testimony we are going to be receiving today, this is probably the most valuable contribution the Federal Government could make. We have people in America who are interested in privately investing, but there are substantial Federal obstacles to making these investments pencil out.

Ms. CHAO. I think you will find complete agreement on our side on that issue. That is one thing that we have consistently tried to emphasize throughout the Department—that the government is not there to over-regulate and it is not there to impose burdensome requirements on all these different projects. So part of that study will address that. Part of our June report will include some analysis of those concerns, as well.

Mr. COX. It may not be high tech to call it R & D, but as all of us can tell you who are running from the floor to vote and coming back here to our hearings, and we've got other subcommittee hearings going on at the same time, it is tough for us to sit down and look through statutes and regulations and decide how to fix them. We are responsible for changing the laws, and yet we can't really do that legislative R & D.

If the Department could invest its resources in making proposals to us on how to streamline existing law it would be of enormous benefit.

Ms. CHAO. Congressman, your comments are noted. I will reemphasize that within the Department.

Mr. COX. The second question brought to mind by watching the Soviet space shuttle, which looks remarkably like our own: is it possible for us to piggyback on the German and Japanese R & D, or is it necessary for us to do that ourselves?

Ms. CHAO. I think that is a big policy debate right now. There are certain parties who feel that America should have its own technology and they should develop their own technology in Maglev. The trade-off obviously is that developing solely American technology would require substantial amounts of new investment. Secondly, there is a time lag involved.

Current Maglev technology is available. It was developed by the Japanese and the Germans after having taken the initial research from the U.S. 10 or 15 years ago. I think there are others who feel there are lots of good opportunities to piggyback over current, existing technology and develop it further and work with foreigners to develop a U.S.-based technology.

That is the source of much debate going on right now.

Mr. Cox. Well, I want to compliment you and Secretary Skinner and Mr. Carlson for your role in the national transportation plan which recognizes—at least implied, if not directly—that the country is operating with negative cash flow and we are having trouble coming up with needed investment for infrastructure and will be relying increasingly on private investment in infrastructure.

As we imagine ways to provide incentives for private investment in Maglev and other new high-tech technologies, I hope that we can consider incentives—tax credits, and so on—as opposed to subsidies because, for the same reason we rely on this private investment in the first place, the Federal Government is, in fact, bankrupt. We don't have the money to make loan guarantees, even though they are off budget. We don't have the money to grant direct cash subsidies. But if we provide people with income tax incentives, that nets money against the treasury only if these people on their own have a productive investment and make money and provide new sources of cash flow.

This may be premature, but is this something that the Department is looking at?

Ms. CHAO. I think at this point it is a little premature to talk about the funding and how to structure it, but I think your point is a good one, and it is one that has been discussed a great deal within the Department.

Actually, our whole view on Maglev has been to try to promote private sector development first, because we believe that such a project is intrinsically attractive because of the economics underlying it. That's how we get the private sector involved, and the government shouldn't support anything that is not basically of economic intrinsic value. That has been the approach that we have been taking so far.

Mr. Cox. Thank you very much.

Ms. CHAO. Thank you.

Mr. MINETA. Well, Madam Secretary, thank you very much for your presentation here today, and Mr. Carlson. We do look forward to this continued dialogue as we develop it. I really feel that we have got to move forward on this, and I hope that we are able to find the will, as well as the financial resources, to make it happen.

Thank you very, very much.

Ms. CHAO. Thank you, Mr. Chairman.

[Ms. Chao's prepared statement appears on p. 64.]

Mr. MINETA. I would now like to call on Doctor Gordon T. Danby, Senior Physicist at Brookhaven National Laboratory, to come forward.

Mr. Danby, we are pleased to have you here. Your statement will be made a part of the record. Please proceed, sir.

TESTIMONY OF GORDON T. DANBY, SENIOR PHYSICIST, BROOKHAVEN NATIONAL LABORATORY, UPTON, NY

Mr. DANBY. Thank you. We appreciate very much the opportunity to express before this committee our concerns for the national interest in third generation superconducting magnetic levitation systems of high speed and relating transportation issues.

I address you representing Jim Powell, my associate, and myself. I first want to address the foreign challenge.

Japan has commenced the first stage of a 300-mile-per-hour principal corridor superconducting Maglev from Tokyo to Osaka. They could have built parallel to the route of their famed Bullet high-speed rail train which runs near the shoreline and which has been operating for 25 years. In fact, it carries more than 100,000 people a day, and it has never killed anybody. (That shows, incidentally how complicated safety is when compared to our railways that kill workers, kill neighbors, and kill passengers, safety is not primarily a technical question alone.)

Instead, they have chosen a much more expensive mountainous route for their Maglev development in order to open up their country. This is costing them three or four times more than it would otherwise.

Sixty percent of the 300-mile route will be in tunnels, 40 percent because of mountains, and 20 percent to be good neighbors in cities. The scope of this is awe inspiring.

They are applying more advanced concepts to this Tokyo-Osaka route than those used successfully at the first generation Miyazaki test facility. For this reason we have called this a second generation system and call our own ideas for a more advanced system appropriate to the very different U.S. needs, third generation.

From 1978 to the present at Miyazaki thousands of guest passengers were carried, speed records well above 300 miles per hour were established, and many successful experiments were carried out, such as simulating earth movements of the large clearance guideway such as might occur due to earthquakes.

Last August in Japan I heard first-hand about their very large-scale and ambitious plans. Since then they have received official approval and have started the first stage. In addition, they plan to have a 30-mile system from the airport to Sapporo, the capital of Hokkaido, operational in 1994. This second system will be the world's first commercial superconducting Maglev, finished several years before the much larger scale Tokyo-Osaka route. This technology no doubt will be imminently exportable in a short time frame.

Now, we have had dealings with the Japanese railway for twenty years. Particularly Mr. Kyotani whose name I left out because I prepared this in a hurry. This Maglev is literally a part-time activity. He is a hard-headed but visionary old technical engineer, the now retired former technical head of the railway. We admire the quality of their work, their determination, and their long-term commitment, which I incidentally find also amongst Japanese collaborators in my high-energy physics activities. They do what they say they are going to do, and with lots of help from Japanese industry.

We are personally gratified also that after extensive study and development they have chosen to develop concepts which we invented and patented many years ago. (Unfortunately, they may have expired.) We did that, in fact, with our own money, entirely on our own initiative.

Meanwhile in Germany a test track demonstration system, which also has carried thousands of guest passengers, has been suc-

cessfully tested. This is an alternate approach to Maglev which they chose as requiring a shorter-term development.

We and many others do not believe this approach has the potential of the superconducting electrodynamic suspension developed by the Japanese. Nevertheless, the German firms who have developed it have plans for export to the U.S.—for example, the Orlando project.

We believe that the Japanese system will prevail over the German approach for two reasons: first, it is technically superior; second, it has the very strong backing of the Japanese Government and people.

Maglev is poised for commercial application worldwide while the U.S. is on the sidelines.

Assuming the Germans also build an airport system in their own country in the next three or four years, both countries will have actual revenue service experience to establish safety criteria, etc., in five to six years. This will permit formidable export policies in the absence of a U.S. alternative. If the U.S. does not move aggressively, Japan will dominate the world markets in this major future transport mode around 2000. Transportation is too large a fraction of the GNP for us to abandon the field to others. It is directly 20 percent. If you count the value-added growth figures I have seen of the Japanese estimates, it is really much more than 20 percent. Their productivity in the last 25 years grew on a curve which superimposes very well on the Shinkensen traffic growth curve. The very expensive new Maglev underground route they estimate will return almost 10 trillion Yen per year in value-added, wealth to society. It is a question of getting better transport in place: the trillion yen construction cost will be well repaid.

Now, transport needs are very different in the U.S. with its dispersed population and industry. We should build third generation systems appropriate to our needs, economic and flexible in utilization and integrated with our existing highway-dominated population and building patterns. We can leapfrog to the forefront if we start now on a five-year construction program.

Maglev has the capacity for individualized vehicles and very fast electromagnetic switching. If integrated with the interstates and railways, the utility of Maglev is greatly enhanced. It can revolutionize mobility without disrupting our present modes of transport.

We have long advocated systems, which we know how to build, which are capable of moving heavy freight at high speeds, in addition to passengers. This greatly enhances the economic viability of Maglev, expanding its utility beyond high population density corridors to much of the U.S. population as a whole. In fact, we are going to expand on that and we will submit that, sir, if that is acceptable, next week. The arithmetic is dramatically different if you have a freight component; otherwise, there are fewer corridors. There is an enormous number of potential routes that would be profitable with freight.

Maglev has much greater potential for widespread beneficial use than new high-speed rail. Its capability for single vehicle operation, light-weight vehicles and low-cost track structures, very high-speed operation, passenger and freight capability, and the absence of the severe roadbed maintenance problems associated with rail all make

it extremely attractive. It will become a very high-speed, dominant, new transport component. However, it will be a good neighbor to existing transport modes.

I'd like to say, in fact, in Japan the same company builds both high-speed rail and Maglev. In a similar spirit, the High-Speed Rail Association is indirectly responsible for me being here to testify. They are also supportive of Maglev, which I think is a very healthy sign for future U.S. transport.

What is required to build a third-generation Maglev system by 1995? The technology has been in hand for years. There are no major barriers to building Maglev. The basic generic technologies now exist scattered around in U.S. industry—mostly developed here for pure research but never exploited otherwise.

What is required is a third-generation design and the technical leadership to pull this together, plus the national will to push forward.

We believe the rapidly accelerating rate of commitment in Japan during the last year does not permit the time for prolonged studies. If private capital is to invest very large amounts of money, they must believe the government is serious. Availability of rights-of-way which are economically attractive for first systems should be the major purpose of Federal and State government support initiatives, as has been reflected in much of your discussion here this morning.

Without secure rights-of-way, obviously, no private enterprise is going to develop Maglev. This doesn't mean they have to own then, incidentally. It has just got to be a sound business operation for the builders if they are technically successful. It should not be, of course, a "savings and loan" guarantee where builders can profit from failure. If the technical proponents fail they should pay the price.

The great bulk of government funding should go to support actual construction efforts by private U.S. enterprises who will undertake at their own risk the high-tech development they deem is required. This will focus the development. Only 10 to 15 percent of the Federal funds can usefully go to generalized R & D, and this should be generic in nature, such as advanced superconductors.

We must minimize the present tendency in the U.S. to produce mountains of paper. A study-oriented program with academic conferences will result in any good U.S. ideas being in the public domain. They will be picked up and exploited by more serious and larger foreign engineering efforts.

The circumstances are that Maglev is an engineering problem whose components are all within the state of the art, but with very few people with the background necessary for a fast track start.

My partner and I feel we are so equipped. I have been personally responsible for the building of—at least for the concepts of building—hundreds of millions of dollars in the last 25 years of high-energy physics devices.

Large scale pure science has been one of our very successful U.S. contributions to scientific and technical worldwide culture. In contrast much of our industrial engineering culture has deteriorated: sometimes it almost makes you cry to see what totally financially oriented managers have done to much of our old basic industry.

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Maglev is an enormous potential industry because, as important as airplanes are, they are still a 10 percent transportation component. So if this vision of Maglev is right, it is potentially huge. That's why it should be domestic.

We urge that the government facilitate new proprietary private enterprise systems that can be built in the next few years. Otherwise the "Boeings" of Maglev will not be in the U.S. and there will be a resulting loss of U.S. technical development, technical spinoffs, derivative patents, and overseas markets. Serious Maglev enterprises should be prepared to put up at least 50 percent of the actual cost from their own funds for a first system designed and built at their own technical risk with proprietary designs.

We caution that U.S. government money not be used to build Maglev systems dependent on foreign technology. This would only serve to subsidize foreign competitors at the expense of long-term U.S. interests.

Furthermore, they do not need this assistance. Maglev systems will be built in the next three or four years in Germany and Japan. These will provide operational experience and safety criteria using their own population at their own expense.

U.S. government funding for Maglev should focus on developing U.S. technology and fostering industrial competitiveness. If foreign Maglev technology systems are to be built in the U.S., they should rely totally on private capital and without hidden subsidies. That may seem very harsh, and it is not meant to be chauvinistic, but we do have to restore our technical culture in this society.

The people who built our basic industries, who were household names, would not even be welcome in the boardrooms of many of our firms who have become successful only as money machines.

Our personal goal is to attempt to facilitate and participate in building by 1995 a working first link in a major corridor based on a third generation Maglev system that is suited in performance and economy of construction to eventually widespread utilization in the U.S. We welcome competition from like-minded people.

Just so it is clear, we are prepared to take long-term leaves of absence from science to work on this development project if we get something major going.

We would like to note our Maglev work has always been private, on our own initiative. (In fact, the Japanese were interested in how we came to think of something that nobody ever asked us to do.) This started when we were two young fellows sharing a house in 1960. We have worked on it in our spare time ever since. In fact, our wives have been the biggest supporters in the country, I would say.

At the request of Senator Moynihan and with the approval of Brookhaven National Laboratory management, we agreed to coordinate the Maglev study for the Environmental & Public Works Committee. This work was done in our spare time. Again, I apologize: I quickly prepared this statement because I happen to have had a major review on a very big experiment Monday and Tuesday and was working night and day. It is a beautiful fundamental experiment, and some of our best technical parts are coming from Japan free. Thanks to our Japanese collaborators. I am not anti-Japanese in fact I admire their dedication. But I also don't want

my children to only flip hamburgers in a "Post-Industrial" decline of the U.S.

Finally, it is important to make it clear that if a U.S. Maglev effort is to succeed the government must seek to facilitate large-scale commitment in a near time frame. A small-scale, study-oriented program will not succeed. Even in the 1970s, at an earlier era when Maglev was more towards the R than the D, this funding approach did not work. The large-scale foreign technical achievements in Maglev were not affected by the small-scale U.S. R & D effort. I don't say that to hurt anybody's feelings, but I don't want people kidding themselves, either, because if you misread history you often repeat it.

Now, I know for a considerable time the Super Maglev Coalition has been working with your colleagues and key staff. I am sure Mr. Shenefelt will be willing to assist further in specific legislative proposals. Jim Powell and I are not terribly good at that, but I would be happy to try and address them as best I can.

Thank you for this opportunity to present our views.

Mr. MINETA. Thank you very much, Doctor Danby.

For this lay person, I'm wondering if you would describe for us the magnetic fields surrounding an operating Maglev system. Is a field generated if a magnetically levitated vehicle is not operating on a particular length of track where the field is being measured?

Mr. DANBY. For the schemes that we proposed, the magnets are only on the vehicle. In the ground there are two things: one, a passive array of—usually a bundle of aluminum wires shaped so that as the magnetic field moves by it induces forces which give you very powerful lift and a restoring force to a non-visual stability point in a magnetic well. It is a two-dimensional spring. Once the vehicle passes, currents and fields stop.

In addition to that, you do have to activate sections of the ground with a linear synchronous motor, and a linear synchronous motor is nothing but an unwound version of the rotary motors that you have in your household appliances, other than you have to keep building more poles all along the guideway. Now, in our designs those motor loops typically have 200 or 250 ampereturns—a very modest level. They are right there as part of the guideway.

These generate an AC field which will not produce any significant exposure compared to the earth's field beyond the immediate guideway on top of the elevated structure. The passengers, in fact, will see, to very good order of approximation the small AC motor field as a DC field, because they are moving coherently with the wave.

There exists today valid concerns about AC magnetic fields, very small biological effects may well be real. The DC fields can be considerably larger. In fact, there is really no known effect at anywhere near the low field levels we would talk about. We plan to make our designs to operate with essentially earth's field exposure

There is a very small but statistically significant piece of evidence as you probably know, that living near power lines of something associated with them has a very small but positive effect on transmutations in the DNA, and cancers. Consideration of a very tiny effect is complicated by the fact that these AC 60-cycle fields

adjacent to power lines are smaller than you often run into in cities and even typically in homes.

I moonlight in medical MRI, and I go in sometimes to help somebody who has a terrible problem where their ultra sensitive scanner won't work properly due to stray fields. You find with subways and so forth you get much larger magnetic fields in cities compared to power lines.

In summary, whether health effects of small magnetic fields are real or not, you have to assume that at least from the point of view of public perception, you had better assume they are real effects. We would avoid the problem by building a system which operated at earths field levels (about 1 gauss.)

Biological effects will be studied. I'm sure DOT will study it. But one has to put it in perspective. It is vastly smaller than most other transport risks. We will make sure that magnetic fields are no bigger or indeed smaller than what people have been exposed to for the last 100 years.

Mr. MINETA. Would this field disrupt communications of any vehicles operating on a highway next to the Maglev guideway or in any other way affect the operation of those vehicles?

Mr. DANBY. No, sir. There will be no effects on a highway or adjacent structures. If you get up to something like 10 gauss in the vehicle itself, which is roughly 10 to 20 times the earth's field, it can affect pacemakers on a passenger. But we don't intend to: our design, as I said, give's on the order of one gauss.

Mr. MINETA. You have referred to the first, second, and third generations. I'm wondering if you would share with us your thoughts on the evolution of future generations of Maglev technology and how these technological advances will be used in the construction and operation of new high-speed systems.

Mr. DANBY. Yes. Well, again, the second-generation Japanese system we approve of and which was also one of our ideas, because we got there first, not because they are not very capable. As a personal side it is nice once in a while in your life to be first! You get the easy hits.

But the point is that that the new Tokyo-Osaka system design is definitely second generation compared to the original one. We will use for our design, as I said, arrangements which will have very low magnetic fields, which can cope with heavy freight, and which will have electromagnetic switching so that if you want to get off at a small station you don't have to stop everybody passing in other vehicles.

In contrast, with high-speed rail where you end up with a huge locomotive typically on each end with 10 or 20 cars in between. The French may go 187 miles an hour (which the Japanese could do too, incidentally, but they don't because, as it is, they have 3,500 people every night working repairing the tracks) but the average speed is much less than that because everybody stops at all stations. And so we want to assist mobility with individual vehicles, like 727s, that will pull over while others keep going so you don't have to stop in every town.

I don't know whether I really answered your question completely.

Mr. MINETA. Well, as you deal with that or with the generation of——

Mr. DANBY. I'm sorry, I apologize. Yes, Maglev systems will continue to evolve further but it will not evolve in a way that would lead to obsolescence of the (dominant cost) right-of-way construction because it basically is unchanged. The big step that the foreigners did for Maglev was make it credible, otherwise we wouldn't be here.

The German system, in our opinion, has pretty much reached a plateau anyway because it is a technology that is pushed to its limits and is not going to change radically. I think the more flexible superconducting system is advanced enough to proceed. The railroads did that and they set a gauge and life went on. People lived with that gauge. In that same sense we will have to live with the basic parameters.

Mr. MINETA. As the evolution of future generations comes about, is it able to benefit the existing system through retrofit? Can we take advantage of that new generation of evolutionary advances?

Mr. DANBY. Yes. I'm sure we can. First of all, the vehicles are a couple of percent of the cost and the medium-tech guideway stuff you put on the ground is perhaps a total of 10 percent. Once you define the supporting strength of the structures, for example, it turns out it doesn't cost much more to make it so you can carry tractor trailers. But that has got to be part of the initial study. Obviously the basic concrete and steel that holds this thing up has to be designed for the loads. Vehicles are light, but if you put heavy freight in it is going to weigh perhaps twice as much as for passengers. The load has to be established at the beginning.

Mr. MINETA. Doctor, you favor in your statement more strongly the Japanese technology, the repulsive design rather than the attractive Maglev technology of the German system. Why do you favor the repulsive versus the attractive?

Mr. DANBY. Well, the attractive system clearly works, but it is based on winding an electromagnet and letting it be sucked into a steel rail like the magnet on your refrigerator door. It isn't inherently stable like our system, where nothing has to be done to give automatic, restoring forces and stability horizontally and vertically. In the German system as the magnets get closer to the steel rails that force goes up dramatically. So you have these very heavy power supplies and sensors that say, "Turn the current down, turn the current up to overcome the instability." This makes the system heavy with limited freight payload.

Furthermore, to be practical the gap used to be a centimeter. In their last improvement they went down to eight millimeters, which is one-third of an inch. So the roadbed has to be a very high quality and maintained to tolerances small compared to one-third inch. The superconducting system can have clearances of forty-six inches. The Japanese like large clearances for protection from earth movements due to earthquakes.

But the German system works, and we wish them well, sincerely. But we honestly don't think it is going far. Basically they have done what they can do with it.

Mr. MINETA. But the German system is much more close at hand to actual construction than the Japanese system.

Mr. DANBY. Forgive me, but that is a perception which is a cultural thing. The Germans, like most Americans, are hyping their product, willing to sell it while they are still developing it. In fact, it has been controversial in Germany. One of its selling points was that they are going to export the system to the Americans even before they have commercial experience in Germany.

The Japanese—I know the way they approach things. The Japanese are building it primarily for their own purposes, not for export. When they are done and it is perfected and is an intrinsically superior system, they will sell it to the whole world. Of course they will.

Mr. MINETA. But why is it intrinsically superior to——

Mr. DANBY. Because it is lighter, it has very large clearances from the guideway, it simplifies and economizes, it can carry—at least in our versions—heavy freight, it has a very strong suspension.

The German system is kept marginal by its weight, plus the weight of all of those reactive power supplies to keep the current turning up and down in a 20th or a 30th of a second. Otherwise the magnets would clamp on to the steel rail.

It is not only us. Right or wrong—and we think it is right—but a great deal of other technical people feel that the Japanese system is intrinsically superior. We wish the Germans well. We are not trying to stop them from developing it, but I think the superconducting electrodynamic suspension is much more relevant to America.

Mr. MINETA. As I look at high-speed trains and TGV and then the German system and the Japanese system, going 180 miles an hour on TGV, having ridden up in a cab, as everything goes speeding by, it is a tremendous sensation. Going 250 or 300 miles on the German system or going 500 miles on the Japanese system, it seems to me on the ground there must be some sense of disorientation. I'm not sure that I want to go every 12 miles and have to have a sickness bag with me just to get to some destination at 500 miles per hour.

Mr. DANBY. I'm glad you said that, because I totally agree. You see a beautiful picture of the TGV and the chateau and the cow, but it had better be plane like a billiard table and any objects better all be far away or you'll get ill. If you go and ride on the Shinkensen, the Bullet train—I haven't ridden on the European high-speed trains—you will notice that the Tokyo-Osaka Bullet train is elevated so there is no problem. But when you enter a tunnel and you go through a transition where there are telephone poles etc, immediately outside the window it can drive you crazy. So that, plus safety, minimum profile on the land, and a variety of reasons is why we believe US Maglev should be elevated.

Mr. MINETA. But is that why——

Mr. DANBY [continuing].—It should be 40 feet in the air. Then there is no problem. It is the angular velocity of passing objects that bothers you. The problem is the same when you take off on an airplane. You look out and you are 150 feet from the ground and it doesn't bother you, and you are already going 250 miles an hour. The problem is something whizzing by at a very rapid angular velocity.

And I don't think you can put these huge high speed rail dinosaur locomotives way up in the air. You can, but you can't do it economically, they're just huge and very heavy. But you are right in your comment: I think you either have got to be in a tunnel or you've got to be elevated, and tunnels are expensive.

The time will come when you can go from California to Washington in an hour and a half in a partially evacuated tunnel, but that is not for our generation. There are no speed limits, the 300 miles an hour we have picked because above that the energy consumed to push the air out of the way starts to become excessive.

Mr. MINETA. Thank you very much.

Mr. Shuster?

Mr. SHUSTER. Thank you very much.

Doctor, we very much appreciate your intriguing testimony. I think I understand why you prefer the Japanese version to the German version, but, as I understand it, you are saying what the Japanese are developing is a second generation and you are proposing a third generation.

Mr. DANBY. Essentially, but, for clarification, the Japanese had, for many years, a test track first generation. Now they are really building for the first time in the world anywhere a very massive, dedicated line in the hardest of places to open up the country.

Mr. SHUSTER. Yes. And that's what you are calling second generation.

Mr. DANBY. Second generation. And we call ours third because we have some tricks that we believe they still haven't thought of, but mainly because we will do it for the U.S.'s dispersed, flexible needs. In Japan they will still run this like the Bullet train—and wisely so—with a huge number of cars zipping from here to here because their culture, as you know, is organized that way.

Mr. SHUSTER. That's what I'm trying to get at. So the third generation differences are that it will be lighter or as light?

Mr. DANBY. It will be comparable in lightness, but more adapted to our needs for individualized vehicles, plus freight, on economical guideways.

Mr. SHUSTER. And that is because of the low magnetic field? Of course, both have the low magnetic field, as I understand it.

Mr. DANBY. Well, the Japanese originally didn't worry about it, but that is not a fundamental error. They are obviously going to do better. People only became worried about magnetic field, as I'm sure you are aware in very recent times. Concern for magnetic fields is real but exaggerated.

Mr. SHUSTER. And in the electromagnetic switching that you are proposing, that would be a difference also? That would give you the capability to go to the individual cars?

Mr. DANBY. Yes. to my knowledge, our ideas are proprietary, and we hope they haven't done that.

Mr. SHUSTER. How fast do you envision your third-generation——

Mr. DANBY. Well, we think the number 300 miles per hour is reasonable. Now, there will be special locations. Obviously, assuming we use interstates, there will be places—perhaps 10 percent—where you'll have to deviate and take some land for elevated structures, almost like overhead power lines, only with a higher density

of footprint of columns on the ground. In some locations one may be forced to slow down.

Mr. SHUSTER. Let me ask you this, because the bells are ringing and, as usual, we are in a time squeeze. If we were to wave a magic wand and say, "Okay, Doctor, let's put together a demonstration project to build your third generation," how many miles of a demonstration project would you need? What is it going to cost you? And how long is it going to take you?

Mr. DANBY. Well, five years we think is a credible number. The length is subject to negotiation, but say 30 miles is a reasonable number. In our judgment if we are going to attract private funds that should be in some sensible corridor that, if judged successful, will then propagate into a real high-usage corridor where people can go and experience and decide if they want them all over the country.

Mr. SHUSTER. How much?

Mr. DANBY. How much money? Less than $1 billion—half a billion dollars. Now, if you do it as you will realistically have to do it by letting say two separate efforts try—that's the real world—it will probably approach $1 billion.

Mr. SHUSTER. I missed that. You say half a billion, but it really would be a billion because——

Mr. DANBY. What I meant is that wherever you imagine one system we would propose to take the half billion, but that isn't the way it will happen. Hopefully—and it is good in principle—there will be a few credible proposals and, unfortunately, there will be 50 non-credible ones. That is going to be a tough problem to figure out who is who.

But that will mean you probably would want, in fairness, to do multiple efforts fast, perhaps on the same 300-mile potential line, or one in California and another one somewhere else.

Mr. SHUSTER. So you are saying two lines? You'd have two 30-mile lines instead of one 30-mile line?

Mr. DANBY. Yes. Two or three. And let's say eventually it is going to come down to one winner, and then you go back and you retrofit those other two lines to be the same system as what was proved to be the most successful. But that's the only way that we know where you can have a variety of things happen in a hurry—put them in parallel, but in a fashion where probably 80 percent of the cost is basically still eventually useful.

Mr. SHUSTER. The Pittsburgh project, which is the German approach, I'm told is $22 million a mile.

Mr. DANBY. Yes. That's expensive. That's our opinion, too. It is an expensive technology.

Mr. SHUSTER. That's over half a billion dollars.

Mr. DANBY. We believe that we can do—once we get into a steady state—the first one obviously you've got to throw in development costs—we believe, and we present this in Texas, that $10 million a mile is a quite conservative number.

Mr. SHUSTER. That's after being built, so that's half the cost of the Pittsburgh project.

Mr. DANBY. And we think that is for real reasons, not just who does the arithmetic.

Mr. SHUSTER. Thank you very much.

Mr. MINETA. Well, Doctor, let me thank you very much for your role, as well as your colleague, Doctor Powell, in the development of this whole technology. To me it is really mind boggling to be able to talk about these kinds of things. It is a far cry from a steam locomotive or a diesel-powered truck. But, in any event, I just want to thank you and Doctor Powell for your work on this whole technology and appreciate your being here today.

Mr. DANBY. Thank you very much.

[Mr. Danby's prepared statement appears on p. 75.]

Mr. MINETA. At this time we have a call of the House. The subcommittee will stand in recess for about 10 or 15 minutes.

[Recess.]

Mr. MINETA. The committee will please come to order.

Mr. MINETA. We have with us Mr. Rolfe Arnhym, Commissioner of the California-Nevada Super Speed Ground Transportation Commission.

We are pleased to have you here.

Mr. Arnhym, you may proceed.

TESTIMONY OF ROLFE ARNHYM, COMMISSIONER, CALIFORNIA-NEVADA SUPER SPEED GROUND TRANSPORTATION COMMISSION, PLAYA DEL REY, CA

Mr. ARNHYM. Thank you, Mr. Chairman.

I'm delighted, pleased, and honored to be here. My name is Rolfe Arnhym. I serve on the California-Nevada Super Speed Train Commission and concurrently as the Executive Vice President of the Palm Springs Chamber of Commerce.

As you know, the States of California and Nevada created a commission to oversee a privately-financed introduction of modern inter-city ground transportation systems. What we envisioned and are on the threshold of putting in place is a network of trains operating in the Pacific Southwest at speeds of 300 miles per hour.

I'm going to paraphrase and summarize, Mr. Chairman, and I won't follow the text exactly in the interest of time.

In December of 1989 the Commission decided to take the initial step in creating this network. At that time we voted to move forward and invited letters of intent from industry. Those letters of intent came in and we sent requests for proposal out to the private sector, with a target date for receipt of July 15 of this year. We are currently anticipating that proposals will be received in that time frame from three consortiums—the first is Bechtel that is partnered with TransRapid of Germany, utilizing the Maglev technology; second Morrison-Knudsen; and third Bombardier, which are utilizing the TGV or the French technology.

One of the primary purposes behind this project is to enhance and facilitate the movement of tourists within the State of California and between California and Nevada. As a matter of fact, at this very moment our mayor, Sonny Bono, is making a presentation on the necessity to put in place in the State of California a tourism council which would take one-half of a cent of the transit occupancy tax and have monies in place to greatly enhance and increase our abilities as a State to be more competitive in the tourism market.

Given what is happening in this country in terms of reduced Defense expenditures, we think the overall tourism industry is a critical one and one where we have an opportunity to capitalize using this technology.

Candidly, the single most important thing that the Federal Government and this committee can do for this project and those that would follow is to assure access of right-of-way along the interstates and other Federally-assisted highways. I realize that you are currently addressing legislation which would facilitate that process and cause the Department of Transportation to issue the necessary regulations.

I don't believe it is necessary for me to get into the ridership potential of this project except to tell you that the expectation is that this train, by the end of this century, has the potential of carrying six million interstate passengers a year, and it is anticipated that among those would be at least one million that otherwise would be using their cars.

We are particularly interested, as well, in commuter applications since, in our region, some of the freeways are carrying over 250,000 vehicles a day and one of the more critical corridors in that is the line that would serve Orange County and would link with trains not only going to Palmdale in the San Fernando Valley, but those that would potentially head to the Palmdale commercial airport, if that is a reality, and certainly along the Artesia Freeway between Riverside and Orange County, as well.

From an environmental point of view we are extremely concerned that we do those things that will take us through to the end of this decade and into the future and provide not only for a greatly enhanced transportation system but significantly improved air quality, in particular. We think that this system offers a hope to answer some of those questions.

It should be no surprise that in Southern California and in the various counties in the eastern portion of the greater Los Angeles area, that we view transportation to be the number one issue of this decade. Behind that, as we strive toward solving those problems, we think that we can positively impact the environment.

Probably the most significant component of this entire project is that it is a privately-financed project. We are not looking to the Federal Government to put it in place, but rather each of the consortiums, when they come forward, are going to come forward with a package that will describe how they are going to pay for this project and how they will be putting it on the ground (route and stations).

So what we, in essence, have is that by October of this year we anticipate making a decision between two competing technologies. We anticipate having a commitment for a management structure. We anticipate having a commitment to move forward financially, and will then begin to concern ourselves with satisfying local, State, and Federal permitting requirements.

Therefore, what we have, in essence, is what would best be described as a first-phase effort, and a golden opportunity—and I use that word in every sense of the word, not just because we are linking California and Nevada, but because it is a real opportunity in dealing with some of the transportation problems that we are faced

with and that, candidly, can impact and will underscore America's competitive position.

It is time that we look at this technology—and meetings are in place that started yesterday and go through today—and put our best minds to work so that we can move into the next century.

I said earlier that technology is in place. This project—this California-Nevada interstate effort—is a project which is the first one that is going to link two States, and therefore it is particularly important and it is unique that we have this opportunity to address your committee this morning on that subject.

If there is a concern—and I believe that Congressman Packard underscored it—that is that there could be some potential roadblocks if the regulatory process takes ten years to develop as they attempt to understand this new technology. It is our hope that the various Federal agencies will monitor and will participate in this project as we move it forward literally and figuratively down the track. We feel we can be helpful not only to the technology in solving California's and Nevada's problems, but we think we can be helpful to the overall Federal process as we define the guidelines and the methods.

In conclusion, we would certainly urge that any obstacles be removed to super-speed use of Federally-assisted right-of-way, and especially the highways. We would urge that every effort be made to make government a partner in this process and that it—and I'm speaking specifically to the Department of Transportation, Energy, ICC, and others—does not force us into a hold mode while we are prepared to move forward.

We need to provide incentives for and otherwise facilitate the U.S. industrial involvement in the fabrication and construction of what we view as a first-generation super-speed system. I would comment further that the second and third generations which will ultimately follow can, not unlike every other technological breakthrough we have made, be integrated and accommodated as we move forward. There is no need to wait for the technology to catch up, and there is no need for the regulatory process to catch up.

Finally, we appreciate your subcommittee's interest in this project and we are enthused about the opportunities that lie ahead of us, and we invite not only members of the subcommittee and the committee as a whole, but the Federal entities that are interested, to monitor our project very specifically to support and to facilitate it.

Thank you, Mr. Chairman.

Mr. MINETA. Thank you very much, Mr. Arnhym.

Before I proceed to Mr. Smith and Mr. Francois I wonder if I might go ahead and interject some questions.

First of all, as far as the bi-State commission is concerned, I assume you have had dealings with Federal agencies, whether it is Department of Transportation, ICC, or the Department of Energy.

Mr. ARNHYM. Yes.

Mr. MINETA. Is there a need to establish within the Department of Transportation a new modal administration to monitor and fund the development and construction of magnetically levitated high-speed transportation systems?

Mr. ARNHYM. The answer is yes, if for no other reason than to ensure that any efforts that move forward are fully coordinated and that we have an opportunity to move this project forward and others have an opportunity to learn from it.

Mr. MINETA. In your recommendation, the second one, you said "to provide incentives." What kind of incentives would you like to see?

Mr. ARNHYM. I think some of the incentives are the opportunity to utilize existing rights-of-way, which is a major incentive because it reduces the overall cost of the project.

The second—and I heard it mentioned earlier in the testimony this morning—is to put some of the various approval processes on what would best be described as a fast track.

Mr. MINETA. It is my understanding that a considerable portion of this bi-state California/Nevada high-speed project will travel along the right-of-way of interstate highway I-15. What is the status of any agreement which you may have with California or Nevada regarding the use of this right-of-way?

Mr. ARNHYM. We are currently, Mr. Chairman, at the front end of working with the various entities within the State of California to assure the use of that right-of-way. We have been somewhat reluctant to move it forward to the approval stage until we receive from the conditional franchisee the specifics with respect to what route they are going to recommend be followed and which stations will be in the mix as part of the phase I effort.

An example of that is that an alternative which we think is a very viable one is one that would branch off from Interstate 15 and go down Interstate 215, which would put an intermediate stop in the Colton area, which is a natural rail hub/freeway hub, and facilitates opening up the specific network.

So before we proceed too far down that path we are looking for a recommendation from the franchisee.

Mr. MINETA. What about your plans that are involving the selection and purchase of rights of way that are not in the public domain? How is that coming along?

Mr. ARNHYM. We are really, once again, at the very front end of that, Mr. Chairman. We have not moved down that as far as perhaps we should at this juncture. Our focus up until now has been on the request for proposal, how to evaluate that proposal, and the criteria for differentiating between the two technologies that are at issue.

We are now just really beginning to grapple with right-of-way requirements, as well as the various regulatory and other agencies in the State of California that we have to coordinate with. We have not moved as far as perhaps we would all hope in that area.

Mr. MINETA. It is my understanding that you have a $500,000 grant from the Federal Railway Administration; is that correct?

Mr. ARNHYM. Yes, sir, that is correct.

Mr. MINETA. Do you view the expansion potential of projects like yours to be limited to regions of the country such as the Southwestern United States in your case, or do you envision a national standardized high-speed system?

Mr. ARNHYM. I think at some point in time we may see a national system. Our objective right now has been to take it from point A

to point B—Las Vegas to Anaheim—and via stations in S. Calif. into something that interconnects the Pacific Southwest. I'm addressing routes that would take us down to San Diego, up to San Francisco, and over to Sacramento and Reno, back down to Las Vegas and Phoenix. That has been our primary focus.

What we are addressing, for all practical purposes, is an operating radius of approximately 350 miles. That is the area within which we would have the least objection and no interruption, if you will, in terms of the airlines interposing any objections or where they see this system as being competitive. We haven't taken it past the 350 mile range, but I would submit that your point is well taken that at some point we would be looking at this technology expanding well beyond that range.

Mr. MINETA. Mr. Arnhym, Congressman Packard is leaving for California just about right now, and he has asked me to submit a number of question. If you would go ahead and respond to the subcommittee in writing I would appreciate it very much.

Again, let me thank you for your appearance here. If you have to leave, feel free to do so. Thank you very much for your leadership on this bi-state commission in hoping to make this thing come about.

Mr. ARNHYM. And thank you for yours, sir.

Mr. MINETA. At this time I'd like to introduce Mr. Charles H. Smith, Executive Director of the Florida High Speed Rail Transportation Commission, and Mr. Francis Francois, Executive Director, American Association of State Highway and Transportation Officials.

TESTIMONY OF CHARLES H. SMITH, EXECUTIVE DIRECTOR, FLORIDA HIGH SPEED RAIL TRANSPORTATION COMMISSION, TALLAHASSEE, FL; AND FRANCIS FRANCOIS, EXECUTIVE DIRECTOR, AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

Mr. SMITH. Thank you very much, Mr. Chairman.

I, too, am very happy to be here. I appreciate the opportunity to talk about the Florida projects and also to participate in what I think is a very important discussion for the future of transportation in the U.S.

Florida recognized the need for high-speed, high-tech transportation over ten years ago and conducted a feasibility study that also was funded by the Federal Railroad Administration at that time. That led to the creation of the Florida High Speed Rail Commission by the Florida Legislature in 1984. So we have been at this business now for a good ten years, and as an official commission for six years.

My comments today will focus on three areas: Florida's involvement with high-speed rail and magnetic levitation train systems—we have both projects underway in Florida; the potential for collocating high-speed ground transportation along interstate highways and other highway and rail corridors; and the importance and necessity for safety standards to control and manage these systems.

With the passage of the Florida High Speed Rail Act in 1984 that created the commission, it authorized this commission to undertake

the planning and implementation of a high-speed rail system in Florida as a public/private partnership—the emphasis largely is on the private part of that—with the intention that the private sector companies would undertake to finance and build this system and to operate it without any public support.

When we started this process six years ago we had about 13 different companies interested in building the system in Florida. Over the past six years we have gradually, through public hearings and through evaluations and analyses, winnowed that group down to, at various times, four companies, then two companies. We are now down to one company, the Florida High Speed Rail Corporation, which is a consortium of about 35 different independent private companies who are now proceeding to build the system.

As Secretary Chao reported earlier this morning in her testimony, this company has already expended over $13 million in the planning of this system and, in fact, gave the commission a $650,000 feel to help review the proposals. So we feel like, in some ways, we are in the money-making business.

The system that they propose is a $2.5 billion, 325-mile, fully electrified, fully dedicated high-speed rail system. It will take about 12 years to completely build out to a fully dedicated system, but when they are finished they will have a high-speed system operating in excess of 150 miles an hour.

The technology will be a Swedish train built by the ABB Corporation—a train similar to the one that they are now putting into service with the Swedish national railroads.

The underpinning of our proposal in Florida for financing is to use real estate development. In my judgment this is the only incentive we can find that can make the private sector be willing to risk the investment of $2.5 billion to build this system.

What we are doing basically is implementing the concept of value capture, a concept where whoever takes the risk in providing and spending funds to build this system should also benefit from the value that is created.

So we are going to allow, through our procedures and our statute, the high-speed rail builder to joint develop properties at stations or other real estate developments that are tied directly into the high-speed rail system. That is the basis for the high-speed rail program in Florida.

I also would like to mention, in response to some of the testimony earlier this morning, that most of the high-speed rail and Maglev projects around the country are grassroots efforts. They have largely started at the State level and regional level. They have not been implemented or recommended at the Federal level, which I think is kind of interesting.

We have had a great deal of involvement with Federal agencies over the past several years. In 1985 we asked the Council of Environmental Quality to designate a Federal lead agency to help us through the national environmental policy review process. Subsequently the Federal Railroad Administration was designated as a co-lead agency. We worked with them on the environmental process very intensively. We are well into the NEPA process. We have had our scoping meetings and met with a number of Federal agencies.

We are also very much involved with the Federal Railroad Administration for safety evaluation for the Maglev system. We are proposing a Maglev project between Orlando Airport and The International Drive tourist area. It is a distance of about 13.5 miles. It is a project which is also authorized by the Florida Legislature to bring high-tech Maglev system specifically to Florida.

We solicited private sector interest in that project over a year ago, received a proposal from a company called Maglev Transit, Incorporated, which is a consortium of Japanese funding and Germany technology. The technology we propose to use is the TransRapid system, which you have heard a bit about this morning. It is the one that is being proposed for Pittsburgh, and also for Las Vegas, California.

But, recognizing that the technology is new—it has not been operated in this country at all. It is in operation on a test track in West Germany where it absolutely has to prove its safety and reliability for U.S. applications. So we initiated a process with Administrator Carmichael less than a year ago, and in that year we have joined in a tripartite agreement with the Federal Railroad Administration, the TUV Organization, which is a German testing facility that is doing testing for TransRapid International in Germany, and the Commission.

We have a three-party operation underway in which we are actually conducting technical evaluations using the Transportation System Center expertise in Boston. That process is moving along real well and I can only commend Administrator Carmichael for jumping into that, because it is absolutely essential that we have the Federal Railroad Administration's concurrence and approval for these systems.

Most of the system of the high-speed rail line and also the Maglev system are not collocated with any of the Federal highways. We do collocate in the corridor of the Florida Turnpike, but for the most part the system is either collocated with an existing railroad—the CSX in the case of Florida—or power lines, and, in some cases, crossing sections of interstate highways.

We have not found that the engineering geometry of the interstate system in Florida is suitable for the high-speed systems. The curvatures are a problem. The overpasses and the interchanges wherever they exist on the interstate will be a problem for any high-speed rail system as it tries to use either the median of the highway or the area alongside of it.

That's not to say that in some future expansion or extension of the system there would not be the opportunity to use interstate highway rights-of-way or other highway rights-of-way. We would certainly encourage the Federal Highway Administration and the Congress, through your legislation, to ensure the opportunity for us to work with FHWA to find ways that we can, in fact, use rights-of-way if we need them.

I think you will find that this is a cost-effective approach to providing much needed transportation capacity in this country, and it can reduce substantially the environmental impacts. If you can use an existing transportation corridor or one that is proposed for a future highway also for high-speed rail or Maglev, you can clearly minimize the impact on environmental resources and the taking of

land. I can assure you in Florida that is a very significant aspect of our concerns.

In the interest of time let me try to conclude very rapidly here.

When we go forward with our program we will be looking to continue to work with the Federal agencies that are involved with us—particularly the Federal Railroad Administration—as we have in the past to make this thing a viable project. I think most people would recognize that we are about 80 percent through the approval and permitting processes for both the high-speed rail system and the Maglev system in Florida. The Maglev system will be certified in October. It can then go to final design and construction immediately thereafter. They intend to have that system in operation in October of 1984.

The high-speed rail system will be franchised by the Commission in September of 1991. They, too, then will be underway with final design and construction, and they can begin to operate high-speed service in Florida in 1995.

So we are dealing here in Florida with real projects—projects that are moving through the planning and final approval process. They will be done. We certainly encourage the other States that are proceeding through the process, as we did starting ten years ago.

Thank you very much, Mr. Chairman.

Mr. MINETA. Thank you.

Mr. Francois?

Mr. FRANCOIS. Thank you, Mr. Chairman.

I am Francis Francois of the American Association of State Highway and Transportation Officials. We are very pleased to respond on behalf of AASHTO to your invitation to offer our views on development of high-speed transportation corridors.

I have given a written statement for the record, together with some accompanying exhibits. What I would like to do now is simply summarize that, if I might.

Mr. MINETA. Those will be made a part of the record without objection.

Mr. FRANCOIS. Thank you.

Mr. Chairman, you are aware that AASHTO is increasingly concerned with transportation in all modes, including rail. We believe that if America's transportation needs into the next century are to be met that we will increasingly need to rely on all transportation modes, that improvements and new technology will be important in all modes, and that we must direct increasing attention to the movement of both people and freight intermodally.

Within AASHTO and the States that comprise AASHTO there is much interest in high-speed rail. You have heard the Florida story just now. Mr. Chairman, you, yourself, recited a number of other States that are looking at high-speed rail currently, the most recent one being a joint effort between Minnesota, Wisconsin, and the State of Illinois looking at the possibility of high-speed rail between Chicago and Minneapolis.

In our "New Transportation Concepts for a New Century" report, copies of which we have given to you, we say the following: "AASHTO believes that the Federal Government should support and participate in a public/private partnership to develop high-

speed rail in those selected corridors in which it will demonstrably relieve highway and airport congestion and improve inter-city travel efficiency. Any comprehensive national transportation program must address rail passenger service needs."

So AASHTO reviewed the issue of high-speed passenger service as an integral part of our Transportation 2020 program. The results of that review of rail were reported in our "Railroad Industry Perspectives" report, copies of which I believe you have.

Similarly, in our Transportation 2020 report on research entitled "Innovation," copies of which I know have been given to the committee, AASHTO is supportive of transportation research in all modes, including high-speed rail.

Mr. Chairman, turning now to high-speed rail and Maglev, AASHTO's support for high-speed rail is not related or limited to any particular type of technology. We believe in the concept of a need for high-speed rail passenger service and believe that the technology used should be dependent upon its feasibility applied to a particular service—that is, we believe there will be instances where trains powered by diesel electric engines would be the most practical for a route, while in other corridors Maglev may be the best answer. You have just heard from Florida, which is using both.

Mr. Chairman, there are a number of related bills pending in the Congress. I certainly don't want to go over all of those with you—bills that relate to Maglev.

There are two points, though, that I would like to zero in on for just a moment. One of those is a reference to Maglev in a somewhat surprising place, which was in S. 1630, the Senate's Clean Air Bill. Section 226 of that bill calls upon the administrator of the Environmental Protection Agency to make an analysis of the health and environmental aspects of magnetic levitation technology and to report to the Congress and the President not later than six months after the date of enactment of the Clean Air legislation.

This mandate to EPA appears to extend beyond clean air, but this is not clear and may be an issue that the committee would want to address.

Mr. Chairman, also in these bills and in other actions of the Congress there appears to be some disagreement as to the role of Federal agencies in Maglev as between the U.S. Department of Transportation, the Federal Rail Administration and the Army Corps of Engineers. The various pending bills do not make clear who is to lead the Federal Government's role in high-speed rail and Maglev. We think this is another issue that your committee may want to take up.

Now, we do support research into Maglev and certainly will look at the economics involved, both within this country and nationwide.

Mr. Chairman, let me now turn specifically to a proposal for placing high-speed rail and, in particular, Maglev along the rights-of-way of interstate highways.

In this regard we would raise a number of cautions, some of which are addressed in S. 221 as reported, this being Senator Moynihan's bill, which would authorize the U.S. DOT to approve re-

quests from States to utilize Interstate system rights-of-way for this purpose.

S. 221 provides that these requests may be approved, and it also includes a new section 1 that was added during the markup of the bill which reads, "Provided that such use will not impair the safe and efficient use, operation, maintenance, rehabilitation, and reconstruction of such highway projects." Now, these are the same kinds of concerns that we have, Mr. Chairman.

There are at least four areas where some cautions need to be stated when considering the construction of Maglev or other high-speed rail facilities in highway rights-of-way, and especially rights-of-way of our high-speed highways such as the Interstate and Defense Highway System.

These cautionary areas include: one, the legality of using highway right-of-way for high-speed rail; two, construction and maintenance of high-speed rail on limited access highways; three, highway safety impacts; and, four, environmental impacts.

Turning first to the legality of right-of-way to use, it needs to be remembered that highway rights-of-way are owned by the States or their local governments, not the Federal Government. In some instances rights-of-way are obtained through negotiation, and sometimes limitations are placed on the usage of right-of-way property by the grantor. In other instances rights-of-way are acquired through the exercise of the State or local government's eminent domain power in court condemnation proceedings.

Condemnation procedures in some States and local governments can place strict limitations on the purpose for exercising eminent domain, which can thereafter restrict the use of the land to specific purposes. This can be true regardless of whether or not Federal funds were employed to help build the highway or the road.

In an effort to take a look at the overall situation regarding limitations on the use of highway rights-of-way for Maglev purposes, AASHTO and the Federal Highway Administration have recently undertaken a brief general survey. The first survey question is: does current State law permit multiple use of highway rights-of-way for other transportation purposes, e.g., Maglev systems? The States were asked to reply yes or no. As of April 27th, 24 responses have been received. In responding, many States have included qualifications that would need to be reviewed in detail to obtain a truer picture.

Looking only at the yes and no responses received to date from 24 States, however, the survey identifies several potential right-of-way problems for Maglev—specifically, 18 of the 24 States said that there was no problem. Six, however—Arkansas, Idaho, New Mexico, New York, North Carolina, and Wyoming—did indicate they would have a problem.

On a second issue, we have assumed that if Maglev is built it will be done by the private sector. This raises yet another right-of-way problem: can State or local government highway rights-of-way be used for a private sector, presumably profit-making, activity.

To get at this question the AASHTO-FHWA survey included the following second question: does current State law permit commercial activities within highway right-of-way?

Of the 24 states responding, there was an even split: 12 said yes, 12 said no.

I again emphasize that there were a number of qualifications on these yes and no answers to both questions. Also, obviously, only about half of the States have responded so far.

While most or all of these problems may be solvable in a given State, the legal status of rights-of-way should clearly be included in any analysis made of using such rights-of-way for Maglev or other high-speed rail facility, especially if they are to be operated by the private sector.

Mr. Chairman, departing from my written comments I would also note there is one other problem that may exist. As I understand it, Title 23 contains a provision that if any Federally-assisted right-of-way is utilized for commercial purposes, then that right-of-way must be paid for and the income from that is to go back into other Title 23 programs. So there are limitations attached to those highway rights-of-way where Federal funds were used for the purchase of them.

Obviously, what the Congress creates Congress could also do something about. This might be one approach to creating a public/private partnership. But we do want to raise the issue to you.

Turning now to limited access highways and Maglev, the use of our Interstate and Defense Highway Systems for Maglev or other high-speed rail facility also raises issue with regard to the entry onto the right-of-way. As you have noted in your opening comments, Mr. Chairman, because of the limited access nature of our Interstates there are special rules that cover such access. The general policy with regard to access on freeways is guided by an AASHTO publication titled, "A Policy on the Accommodation of Utilities within Freeway Right-of-Way." Copies of this policy have been given to the committee.

Now, while AASHTO has no authority to impose this or any other policy on the State or local governments, it is, nevertheless, commonly enforced by the States and is employed by the Federal Highway Administration to guide its actions in this area. It would clearly apply to Maglev or high-speed rail installation in the same manner as to other utilities.

The policy strongly discourages any longitudinal installation. If anyone makes a request to the State or local government owning the freeway that follows this AASHTO policy that request must show several things, two key items being: A, that the accommodation will not adversely affect highway and traffic safety; and, B, that alternate locations are not available or cannot be implemented at reasonable cost.

There are several other clauses. The policy was adopted because of the special nature of freeways, which carry very high volumes of traffic at high speeds and where major accidents can be caused if drivers encounter unexpected obstacles.

In addition, it is recognized that many of our Interstates and other freeway facilities will need to be widened over the coming years and that adequate right-of-way to accommodate such widening must be preserved.

Again, it is possible that in given situations concerns expressed in this AASHTO policy can be resolved. But before any specific

Maglev or other high-speed rail corridors involving freeways are seriously considered, the matters addressed in the policy must also be considered and discussed with the State or local governments owning the highway, and I would add, also, with the Federal Highway Administration.

Turning now to highway safety, proposals to place high-speed or Maglev trains longitudinally in the right-of-way of city streets or low-volume, low-speed roads may not create safety problems in many situations, although there can be exception even there.

Looking at Chicago and New York, for example, elevated trains have been commonplace for generations along city streets. The situation can be very different, however, when high-speed or Maglev trains are placed longitudinally in the right-of-way of a high-speed freeway such as an Interstate highway. Highway safety experts agree upon the desirability of maintaining a so-called "clear zone" or unobstructed recovery area in the median strip and along the edges of such high-speed highways to allow room for vehicles leaving the roadway to either recover and return to the pavement or to run a reasonable distance before colliding with an object.

One of the leading reports on Maglev high-speed rail was released in June, 1989, entitled, "Benefits of Magnetically Levitated High-Speed Transportation for the United States." The report was prepared by the Maglev Technology Advisory Committee reporting to the Senate Committee on Environment and Public Works and was published by the Grumman Corporation. A copy of the cover of that report is attached to my written testimony. This is the report, itself, in full color. That cover really says more than words as to what our concerns are.

You will note on the cover that the track for the Maglev train is mounted in relatively close proximity to the edge of the freeway on concrete piling. The text of the Maglev report suggests that the twin concrete tracks for a Maglev train be mounted either in the median strip or along the edge of an Interstate highway on piers erected 50 to 100 feet apart.

As the text describes, it is probable that the tracks supported on the piers would be elevated up to 40 feet high, or perhaps more, to help assure avoiding a roller coaster ride when clearing bridges and other obstacles.

This type of construction raises two safety questions, the first being the impact of the piers on vehicle and driver safety, and the second being the impact of vehicles on the piers, and thus the safety of the high-speed trains.

Taking up the latter safety question first, it needs to be understood that while heavy truck trailer configurations are supposed to travel at 55 to 65 miles per hour and weigh in at about 80,000 pounds gross weight, some such heavy vehicles do travel at much higher speeds and can weigh much more—perhaps 50 percent more. The impact of such a heavy truck colliding with one or more piers would need to be taken into account in the design of the pier and track structure if the piers are located sufficiently close to the pavement for such collisions to occur.

With regard to the first safety question, some discussion of the clear zone concept is in order. There are two AASHTO publications that bear on this, the first being a brief document titled, "A Policy

on Design Standards Interstate System," which was last revised in December, 1988. We have also filed a copy of that.

A couple of quotes from that document: "A recovery area of unyielding objects should be provided. When provision of such an area is not practicable, any unyielding objects within its limits are to be made breakaway or to be shielded by installation of crashworthy barriers."

To go on, another quote: "The width of the clear recovery area is to be commensurate with the design speed and roadside conditions. The width is to be determined through application of currently accepted procedure."

Now, as to the design of that clear zone, this is covered in yet another AASHTO publication, a rather bulky one which we have also provided a copy of to you. It is entitled "Roadside Design Guide." It was published in 1988 and is now being widely used by Federal, State, and local government design engineers.

Chapter three of the guide is titled, "Roadside topography and drainage features." Section 3.1 of that chapter is titled, "The Clear Roadside Concept." And Section 3.3 is titled, "Application of the Clear Zone Concept."

Taken together, these two sections of chapter three describe the safety concerns involved with providing clear zone. Beyond this other chapters of the guide contain information and guidance that are pertinent to the situation.

Section 3.1 traces the history of the clear zone concept from 1960 through the AASHTO Yellow Book of 1974 and on to development of this 1988 guide.

Mr. Chairman, the clear zone or recovery area issue with respect to our Interstate highways and other freeways is an important highway safety consideration, one that needs to be taken into account in any proposed high-speed rail installation along or adjacent to such road.

Now, it may be that this problem can be solved in some instances, but it needs to be recognized there may be some where it can't. Again, it is a caution and it is an issue that clearly lies within the jurisdiction of this committee.

Mr. Chairman, to again depart from my testimony for just a moment, there is something I left out that I meant to put into it. There is one other problem with operating overhead structures immediately adjacent to highways when one talks of the colder climates. It is called ice. It is certainly possible that in sleet storms in the course of the winter ice accumulations on overhead structures can occur. If those accumulations break loose and fall on heavy traffic we have yet another problem that we would need to be worried about.

Let me turn now to Maglev and the environment. The report prepared by the Senate's Maglev Technology Advisory Committee addresses this issue. We are pleased to see that many matters are being addressed, and I was also pleased to hear Doctor Danby's testimony here this afternoon.

There is one issue that we think, however, needs to be thoroughly examined. Mr. Chairman, you asked questions with regard to this. That is whether there is any possibility of the interference of the magnetic fields or the electrical current used to propel these

vehicles with the electronics and the computers of the vehicle fleet that would be using the highway system.

As you are aware, we are moving more and more into electronically controlled fuel systems. We are probably going to enter during the 1990s intelligent vehicle highway systems which will much more involve electronic means to communicate with the vehicle and the driver—ultimately possibly moving on toward automatic vehicle control systems.

We only ask the question that we need to be certain that Maglev is fully compatible with these. It may be, as Doctor Danby indicates, that depending on the design there can be full accommodation. But we believe it is an issue that certainly needs to be looked at before we move too far.

One way of doing this might be to take up the section of S. 1630 where they have already asked that a study be done on environmental impacts and simply add this to it, or some other approach.

Mr. Chairman, let me again state that AASHTO is fully supportive of high-speed rail in those instances where it offers benefits to meet America's mobility need. We believe, for example, that a conventional or Maglev high-speed rail might be a good solution to air traffic problems in corridors of 300 to 500 miles in length. A solution that could then free up airport capacity now used in these short-haul corridors that could then be used for longer flights.

We do have some concerns about the placement of Maglev trains longitudinally in the rights-of-way of freeways. We have outlined some of those concerns to you. We think they should be taken into account.

We also think that we need to move forward and take a good, hard look at this.

Thank you, Mr. Chairman.

Mr. MINETA. I thank you very much, Mr. Francois, for your very fine statement.

Mr. Smith, with regard to the high-speed project which will link Tampa, Miami, and Orlando at a total cost of some $2.5 billion, could you break out for us the approximate costs as they relate to right-of-way, station construction, and purchase of vehicles.

Mr. SMITH. Well, I can't give you exact figures, Mr. Chairman. The right-of-way generally would be about 20 percent of the total cost, we think. Keep in mind that much of the right-of-way, for example, is already owned by the State. In the case of one of the railroad lines, the CSX corridor between Miami and Palm Beach is a 65-mile corridor. It is already owned by the State. It was purchased for $264 million. That right-of-way will be made available to the high-speed rail operator on an arrangement where he will actually pay lease for the use of that corridor. He will do the same thing if he were to occupy State-owned land that is part of the Florida turnpike, which is another major segment of his corridor.

Wherever he has to acquire property, of course, it is expected that he would acquire property on his own.

We also have the power of condemnation. If it is required to acquire property through condemnation, the Commission can exercise that power.

With respect to the vehicles, the vehicles are about 10 percent of the total cost. The major portion of the cost is going to be the con-

struction of the guideway, whether it be the Maglev guideway or the rail track, itself. We do have those figures broken down; I just don't have details with me.

Mr. MINETA. What kind of factors did you take into consideration in the selection of the Swedish high-speed technology? Not only the factors that you looked at, but also the process by which you came to the conclusion that you would deal with the Swedish highway technology.

Mr. SMITH. When we started our process we had a competitive planning process among several different companies. We had technologies that represented TGV technology, German ICE train technology—even the Maglev systems were also candidates for the long system back seven years ago.

Our Commission undertook several kinds of evaluations. One, of course, is that we subjected it to what we considered the technological assessment: were these systems ready for commercial deployment? In the case of the Maglev systems, seven years ago we had to come to the conclusion that the Japanese repulsive magnetic levitation system was not ready for commercial deployment at that time, and it is not ready today, as has already been reported by other people.

The TransRapid system, on the other hand, technologically was ready. We know that the TGV system works. You can go ride on it. It operates at 186 miles an hour. It is a system that has proven itself. We know what the cost and the energy consumption and maintenance requirements are because we have the records from the French industries that developed them.

Probably more important is the process we went through. Fundamentally what was required in our case was that the system had to be able to be financed by the private sector, and that meant that technology was not the principal concern we had. Obviously we wanted high-speed rail, and we have defined high-speed rail as anything that can operate in excess of 125 miles an hour. So ability to finance was the principal criteria during the course of the process that allowed us to choose the company that we now have going through the detailed process, the Florida High Speed Rail Corporation.

It so happens that that is also the company that had the ABB, the ASEA Brown/Boveri train, the Swedish train, as part of their consortium. So they were able to demonstrate to us that they could meet all of the financial requirements, as well as other requirements—the environmental protection, the acquisition of the right-of-way that was necessary. All the elements of those plans they were able to demonstrate to us that they could accomplish it.

The process we followed over the period of two years that we were assessing these was a number of both informal and formal public hearings that our commission conducted. The last one we had, which was a three-week marathon in October of this year, we subjected at that time two companies, the TGV company and the Florida High Speed Rail Corporation, to a very formalized evidentiary hearing in which they each had to present to us information which then our Commission was able to judge. That is why we selected at the conclusion of that hearing the Corporation to go forward in the process.

Mr. MINETA. Do you know whether or not a similar process was used to select the magnetic levitation demonstration project connecting the Orlando International Airport with International Drive?

Mr. SMITH. In that case the process was similar. We issued an RFP—request for proposals. We had three expressions of interest from the company that we selected, MTI, which was originally intending to use the Japanese version of the Maglev system. They came to the conclusion that that technology was not ready, so they went and worked out an arrangement with TransRapid International, the German technology.

We also had a proposal initially from the HSST Corporation, which is another Japanese Maglev technology supplier. And we also had some contact from companies that were proposing technologies that were not quite ready for commercial deployment, and we had to basically reject them.

What happened in the final analysis, Mr. Chairman, was that all the other competitors dropped out of that process, leaving only the one company, MTI, with the German TransRapid system. So our job at that point was not to compare one with the other, but rather to determine that the company that was proposing could meet the requirements of our statute, which are very, very specific in terms of environmental concerns, in terms of safety, in terms of ability to finance. All aspects of the process were evaluated.

In the preliminary stage of the process that we are at, they have met those criteria. They are now moving forward in the process to detail out their plans. That's the process that will now go forward over the next several months.

For example, they will have to meet some very stringent environmental mitigation requirements in the area that they are operating in because it happens to be a wetlands area in Florida and we are very concerned about wetlands in our State.

Mr. MINETA. Is it the Orlando Airport/International Drive project that is using a portion of a public utility power line right-of-way?

Mr. SMITH. That's correct.

Mr. MINETA. And did you analyze the potential impact of the power line's magnetic field on the TransRapid vehicle's propulsion system?

Mr. SMITH. No. That has not been done. That is underway as part of the planning process that the company will actually have to do.

We did do an initial determination using our consultants to evaluate the EMF effects—the electromagnetic effects. As was testified by Dr. Danby this morning, it appears for the TransRapid that the measurement of that effect, which is called a gauss, the TransRapid only generates about one gauss which, from my understanding, is probably less than what is being generated by these fluorescent lights above us.

So, based on our preliminary—don't worry. I don't think it is going to be a problem.

Mr. MINETA. Please turn off those lights.

Mr. SMITH. We don't think that would be a problem. But, as Mr. Francois has reported, we, for example, will be operating out of the

Orlando International Airport. It is very important that the EMF effects or any other electronic aspects of the Maglev system don't interfere with aviation systems, that they don't interfere with pacemakers of the riders, or that they don't interfere with other kinds of communications that might exist in the area. That evaluation is underway by the consultant.

Of course we, ourselves, as a Commission, will then evaluate what they are doing to make sure that we agree with it.

Mr. MINETA. Could you explain the nature of your understanding with the Federal Railway Administration regarding the safety standards which will be applied by the FRA to high-speed projects in Florida?

Mr. SMITH. Yes. As I reported, we are working with the Federal Railroad Administration in a tripartite agreement between ourselves, FRA, and the TUV company or organization, which is an independent testing facility in Germany. The standards that FRA will be looking at probably will be to assess the work that has been done in Germany, determine whether that is compatible and consistent with U.S. concerns in terms of the kinds of technology and the environment in which we will be operating.

Whether or not FRA is able to come up with specific standards at the time that we are ready to go forward with the project has yet to be determined. We obviously will make certain that all of the safety and hazard evaluation procedures have been undertaken. We, ourselves, will be concerned about that but the FRA under the 1988 Federal Railroad Safety Act has the jurisdiction for that, of course. They will have to, in effect, advise the Commission and advise the applicant in this case that they have concurred with the safety assessments, the hazard analyses that have been conducted in Germany, and which will also be subjected to further review by their scientists and experts at TSC in Boston, which is also underway.

So we feel confident that the process that FRA has underway will conclude either advising the Commission that the safety requirements are satisfactory, but we also recognize—and I think they recognize—that this project may very well be the basis on which they are able to then further evaluate what kind of safety standards or requirements may have to be instituted. In other words, to actually use the Florida project as a model from which you can then develop the specific safety requirements.

Now, obviously, we are going to have to be certain—and we will be certain in Florida—that this system is both safe and reliable before it goes into operation. But I think from that you can then evolve additional standards based on actual testing and observation.

Mr. MINETA. Mr. Francois, you have provided the subcommittee with some very insightful testimony on the clear zone concept as it applies to high-speed highways such as our interstate system. Do you know offhand the approximate percentage of traffic accidents on our interstate highway system which involve vehicles leaving the roadway?

Mr. FRANCOIS. Mr. Chairman, I do not have that information with me. I can develop it and provide it to the committee.

Mr. MINETA. Would the clear zone of a particular highway be potentially less compromised if elevated high-speed guideways were limited only to the outer edges of highway right-of-way?

Mr. FRANCOIS. Certainly. That would improve the situation. The further away you get it, the better.

The problem, of course, is that terrain does change and some rights-of-way are very narrow because of a terrain problem. But the goal would be to get it as far away from the edge of the highway as possible.

Mr. MINETA. In your testimony you allude to the fact that various departments of the Federal Government are involved in Maglev research and development. Do you believe that the Federal Highway Administration has been adequately consulted and involved in assessing the safety concerns of sharing Federal aid highway rights-of-way with high-speed ground transportation projects?

Mr. FRANCOIS. Mr. Chairman, I can't determine whether they have been or not. I did note that the survey we are carrying out is a joint effort of AASHTO and FHWA. My impression, however, is that this is an issue that frankly hasn't been looked at in enough depth to give the kind of answers we need. I do know that the Federal Highway Administration was working with the Senate on the bill that I referred to, and I think the language that is in that bill was provided in part by the Federal Highway Administration to the Senate.

Mr. MINETA. Do you think that would call for the establishment of a new modal administration within the Department of Transportation?

Mr. FRANCOIS. Mr. Chairman, you have already got the Federal Rail Administration which, as we have heard with other testimony here, has been working with Maglev for a number of years.

I would hesitate to call for another administration, particularly until we know more about Maglev. If it is an administration it probably ought to be a high-speed rail administration, but then you are right back into the business of the FRAs. So I think our feeling, at least at this point, is that there is not need for a separate administration—at least for now.

Mr. MINETA. What about the Army Corps of Engineers?

Mr. FRANCOIS. Mr. Chairman, I'm not quite certain just how the Corps of Engineers got involved in this whole process in the first place. They certainly do have expertise in a number of areas. But I think our feeling is that this is essentially a transportation issue and that the U.S. Department of Transportation is the best place to handle this.

Mr. MINETA. Are you comfortable with the current approval process within FHWA as it relates to a State's request for shared use of the right-of-way of Federal Aid highways?

Mr. FRANCOIS. Yes, Mr. Chairman. That process has worked well over the years. We did have a situation about two or three years ago, as you may well remember, with respect to fiber optics. We did walk our way through that process to the satisfaction, I think, of both the states and the Federal Highway Administration. So this is not a new issue with us, and it is something that I think the States and FHWA have learned to work with.

So yes, we are pleased with the current process.

Mr. MINETA. Would AASHTO's support for high-speed transportation projects vary depending upon whether or not the project was owned and operated by a public or private entity?

Mr. FRANCOIS. Mr. Chairman, I think we would prefer that it be a public entity according to the policies we have developed, but we do talk in terms of a public/private partnership.

Now, that certainly in the research area we think makes some real sense. It may make sense in the right-of-way area. But basically we think it should be a private sector activity.

Mr. MINETA. Counsel, do you have any questions?

[No response.]

Mr. MINETA. If not, let me thank both of you for your testimony and help here in trying to get us more knowledgeable.

I'm really looking forward to what you are doing down there in Florida, Mr. Smith.

Thank you very, very much.

[Mr. Arnhym's prepared statement appears on p. 58.]

[Mr. Smith's prepared statement appears on p. 136.]

[Mr. Francois' prepared statement appears on p. 91.]

Mr. MINETA. I'd like now to call on Mr. Don Deer, Chairman Emeritus of the High Speed Rail Association from Pittsburgh, PA.

Mr. Deer, we are pleased to have you here. Your statement will be made a part of the record. Please proceed in your own fashion.

TESTIMONY OF DON DEER, CHAIRMAN EMERITUS, HIGH SPEED RAIL ASSOCIATION, PITTSBURGH, PA, ACCOMPANIED BY T. PETER RUANE, PRESIDENT, AMERICAN ROAD AND TRANSPORTATION BUILDERS ASSOCIATION

Mr. DEER. Thank you, Mr. Chairman.

Mr. Chairman and members of this distinguished committee, on behalf of the High Speed Rail Association and the American Road and Transportation Builders Association, of which High Speed Rail Association is a member, I am honored to have the privilege of submitting this statement to you today.

With me here today is Doctor Peter Ruane, President of ARTBA.

Mr. Chairman, with your permission I will summarize my written comments as much as possible. Many of the points that are contained in my testimony have been made repeatedly, so I will strive for brevity.

At present, HSRA includes members of the financial community, the engineering and design profession, labor unions, construction industry, rail equipment manufacturers and suppliers, Maglev researchers, service providers, professionals, academia, and national, State, and local agency employers. We also include for the first time two American aerospace companies.

Officials from every State high-speed rail commission belong to our organization, and we maintain close contact and a working relationship with each of them.

High Speed Rail Association has worked with Congress to pass legislation enacted in 1988 to permit tax-exempt bonds to be used to finance high-speed rail systems. Our current chairman, Mr. Paul Reistrup, former president of Amtrak, testified before the Senate

Commerce Committee on behalf of HSRA last fall. Mr. Robert K. Pattison, Vice Chairman of HSRA, appeared before that same committee just over a month ago.

Mr. Chairman, lately interest in magnetic levitation transportation has grown exponentially in the Congress, the Administration, the media, and the public—a development which we applaud. The High Speed Rail Association strongly supports these initiatives. Indeed, we support all efforts to commercialize both advanced wheel-on-rail and Maglev systems in the United States.

But amidst the growing sentiment that we as a Nation must invest in leapfrog technology, research, and development, in order to retain our world technological competitiveness we must also continue to ensure the vitality of our transportation infrastructure that enables us to compete in the first place.

As I will explain further in my testimony, plans are now underway in several regions of the country to implement existing high-speed ground rail transportation technologies. These efforts, along with any new Federal Maglev research and development initiative, deserve the same manner of support by the Federal Government that is enjoyed by the air and highway modes.

Mr. Chairman, HSRA strongly believes that Federal policies should encourage the immediate corridor implementation of advanced wheel-on-rail and Maglev technologies which offer us the benefits now of reduced congestion, increased energy conservation, and lowered pollution.

I believe it will be of considerable interest to this committee that highway officials have begun to support high-speed transportation proposals. In Florida, State highway officials are concerned with the fast-growing traffic between Miami and Fort Lauderdale. They say that if nothing is done, 44 lanes of highway would have to be in place after the turn of the century to handle the turn of the traffic. Mr. Chairman, the land-use patterns simply do not allow a highway of that magnitude, and officials there say high-speed rail is essential for future mobility.

The Florida Turnpike is cooperating with the high-speed train planners, expecting to share part of its right-of-way with advanced steel-wheel trains.

In Texas, that State's Turnpike Authority has been the inspiration behind the high-speed network proposed there. Officials in Texas again cite highway capacity constraints, particularly in urban areas, as the justification for high-speed trains. California and Pennsylvania are also voicing such views.

Mr. Chairman, states and regional authorities across the country are now seriously considering high-speed ground transportation as an alternative to congested highways and airports. I will not attempt to describe each project since the committee already has had testimony on several of these. I will, however, provide for the record our references to each of these fine projects.

These efforts represent a groundswell of emerging support across the United States for high-speed rail and its potential to help ease our congested air and highway transportation modes. Members of our association, who are actively involved in every one of these proposed projects as planners, administrators, or participants, above all recognize the environmental benefits in terms of clean air and

energy savings to be gained from implementing new, electrically-based systems of transportation encompassing both advanced wheel-on-rail and Maglev technologies.

We wish to make it clear that this association supports all types of high-speed ground transportation, whether it is French, German, Swedish, Italian, Japanese, or Canadian technology, or a U.S.-designed second or third generation Maglev system. It is with this perspective—as proponents of all high-speed ground transportation technologies and applications—that the association offers comments on a number of legislative proposals advancing high-speed ground transportation now pending before the Congress.

In the interest of time I will submit these comments for the record, also.

The key point I believe that we would like to make in one of these commentaries is that our association advocates, where safety permits and where it is economically feasible, the use of interstate highway rights-of-way for all high-speed ground transportation technologies.

Our association believes that Federal policies should support implementation of all types of high-speed rail systems because substantial plans for implementation of high-speed rail are already underway across the country. Many of these projects, as highlighted earlier, are significantly advanced among the hard path to implementation, construction, and operation. Federal support in the form of loan guarantees or other assistance would provide the final piece to the financial mosaic that in some proposals has taken the private sector a decade and millions of dollars to assemble.

For every high-speed rail project now under consideration, direct and indirect infrastructure costs account for approximately 80 percent of the capital investment required.

High-speed rail rolling stock and train sets account for, at most, 20 percent of the total capital investment. Thus, the vast proportion of the new economic development construction activity and employment generation accompanying any of the $2 billion to $5 billion high-speed rail projects now under consideration will take place entirely in the United States. And, as the Pittsburgh initiative develops and relationships of foreign technology suppliers with other domestic manufacturers expand, high-speed inter-city rail trainsets could be assembled in this country even as the domestic Maglev technology manufacturing program begins to energize.

High Speed Rail Association asks only for an unjaundiced appraisal. As a Nation, we have made a substantial Federal commitment to building and supporting our highway and air mode and our railroads to move people and goods from place to place. HSRA believes that it is critical to our collective future to maintain and nurture that investment.

At the same time, however, increasing gridlock and winglock and escalating environmental concerns demand that the Federal Government promote a transportation alternative that is environmentally sound and economically efficient. That alternative is high-speed ground transportation.

In order for us to meet the crisis of congestion we now face, Federal policies must explicitly encourage and support new solutions

in transportation—solutions such as Maglev and high-speed trains. Only in this way can we meet the challenges of the future.

Mr. Chairman, we appreciate the opportunity to submit this statement. The High Speed Rail Association and ARTBA would like to formally extend an invitation to you and the members of the subcommittee to visit with us at our 7th Annual International Convention to be held next week, May 7 to 10, in San Antonio, Texas. We expect attendees from 15 countries around the world, including the Soviet Union for the first time.

Thank you very much.

Mr. MINETA. Thank you very much, Mr. Chairman, for your statement.

You just added another word to my vocabulary—winglock.

Let me ask you, Mr. Deer: would you give the subcommittee some examples of how the 1988 legislation allowing the use of tax-exempt bonds to finance high-speed projects has been applied to specific projects? And how effective is this approach compared to direct Federal participation in these projects?

Mr. DEER. I am not sure that I can give you a specific example of where it is fully in place at this point. What I believe, Mr. Chairman, I can refer you to is the tax-free bonds—I suppose principally because of greed, if for no other reason—do tend to sell very readily, and have been used in various and sundry ways. One which comes to mind was the saving of New York City during its bankruptcy a few years back.

As I recall, the bonds had absolutely no value behind them except the paper they were written on, and they sold out in a matter of about a week or so because the tax-free interest was raised a percent or two above the previous bonding.

Mr. MINETA. Are you aware of the specific types of agreements which govern the use of public rights-of-way by private high-speed transportation systems in Europe or Japan? If so, could these serve as models for similar projects in this country?

Mr. DEER. Mr. Chairman, I am not personally that familiar with those. I'm sure someone within our organization is. But I can't respond to that personally.

Mr. MINETA. As I understand your testimony, your association supports the further development and construction of all types of high-speed ground transportation technology. Would you share with us your thoughts on the characteristics of different technologies which might make one type of system more suited to a particular corridor than some other type of system?

Mr. DEER. Yes, sir. I think that a good example would probably be the Northeastern corridor. For the foreseeable future it is unlikely that that corridor would lend itself to Maglev. The problems I think were cited earlier in—I'm not sure who's testimony, but I think somebody referred to it generally this morning. In acquiring the proper right-of-way, the permits, the various States and the regulations that would have to be either altered or permission gained, it would considerably slow that corridor for Maglev. There are, however, much quicker ways to increase the speed on that corridor with steel wheel and steel rail.

Mr. MINETA. All right.

Counsel, do you have any questions?

[No response.]

Mr. MINETA. Mr. Deer, thank you very, very much for your testimony here and the work of the High Speed Rail Association. I am pleased to see that Doctor Ruane is here representing the ARTBA, as well.

Again, thank you very, very much for your presentation here.

Mr. DEER. Thank you, Mr. Chairman.

[Mr. Deer's prepared statement appears on p. 81.]

Mr. MINETA. There being no further business before the subcommittee, we stand adjourned.

[Whereupon, at 2:12 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

PREPARED STATEMENTS OF WITNESSES

STATEMENT OF ROLFE G. ARNHYM
MEMBER OF THE CALIFORNIA-NEVADA
SUPER SPEED GROUND TRANSPORTATION COMMISSION
before the
HOUSE PUBLIC WORKS AND TRANSPORTATION COMMITTEE
SURFACE TRANSPORTATION SUBCOMMITTEE

May 3, 1990
10:00 A.M.

OVERVIEW

My name is Rolfe G. Arnhym; I serve on the California-Nevada Super Speed Ground Transportation Commission and I am Executive Vice President of the Palm Springs Chamber of Commerce. The states of California and Nevada created the Commission to oversee the privately financed introduction of modern intercity ground transportation. We envision an eventual network of trains operating up to 300 MPH among the major centers of the Pacific Southwest region.

In December 1989, the Commission decided to take the initial step in creation of this network by asking the private sector to identify a commercially-viable project linking the Las Vegas Valley with one or more Southern California candidate station areas under a franchise awarded by the two states. Three internationally-renowned North American companies have filed

formal Letters of Intent to submit proposals for a franchise by July 15, 1990; the three are Bechtel Corp., Morrison-Knudsen Co. and Bombardier Corp. These franchise proposals will be required to address providing commuter services within Southern California as well as linking as many of the candidate areas as possible.

FEDERAL ASSISTANCE

Evaluation of these proposals is being assisted by a technical studies grant from the Federal Railroad Administration under provisions in FY 1990 appropriations concerning "super speed fixed guideway activities". The Administration's FY 1991 Budget proposal allows for an expanding federal role in assisting and developing super speed train projects and technology. That role expansion is long overdue.

While we support continuation of federal assistance activities as outlined below.

The single most important thing the federal government could do for our project is to assure access to right-of-way alongside Interstate and other federally-assisted highways.

RIDERSHIP POTENTIAL

The benefits of super speed trains to our environment and the relief of congestion are extensive, especially if they are located adjacent to major highways where their impacts will be no greater than those already present due to the highway. The Commission has just completed studies which highlight the

benefits to be received from a super speed train project between Southern Nevada and Southern California. Such a train has the potential to serve over 6 million inter-state passengers a year; included among those travelers are 1 million who would otherwise be driving their own cars.

The Commission is particularly interested in the commuter potential for super speed train service that could link growing bedroom communities with expanding job centers. There is currently no commuter rail service in our region and some of the freeways are carrying over 250,000 vehicles a day, most of them in bumper-to-bumper traffic. Round-trip commutes in this corridor commonly take up to four hours daily. Preliminary numbers indicate that the super speed train could carry a minimum of a half-million commuters a year. Two lines serving Orange County and linking with trains going through Palmdale and the San Fernando Valley could carry another 2.3 million passengers, many heading for the new Palmdale Commercial Airport.

ENVIRONMENTAL BENEFITS

These ridership statistics, not only, support the financial feasibility of the private construction of the super speed train, but they also promise major environmental gains. As everyone is well aware, our region is struggling to meet healthful air quality standards. the super speed train actually offers some hope; over 1 million inter-state travelers and between 1.5 and 2.5 million commuters could leave their cars to ride this new

fast, quite, non-polluting system.

Approximately 70 million automobile vehicle miles would be eliminated from the region's trips each year by the train, reducing tail pipe pollutants by hundreds of tons and saving millions of gallons of fuel. In fact, we estimate a fuel-use reduction of 17% just with the train in the Southern Nevada-Southern California corridor.

These are net gains for the environment. And it is important that we note this because often we hear talk about the need for off-sets or trade-offs for industry if we are to move ahead on something like this. We ought to view this as a net benefit to the environment and not give that up.

OUR PRIVATELY-FINANCE PROJECT

In addition to the environmental benefits, the California-Nevada Super Speed Train will provide the United States with a chance to be on the cutting edge of new transportation technology at no cost to the taxpayer. Reliance on private financing for the project is possible through value capture development opportunities at stations as well as ridership that will generate revenues from the fare box.

The Commission is going to select a conditional franchisee late this year. After satisfying local, state and federal permitting requirements (environmental and others) and obtaining approvals

by the legislatures and governors of both states, we hope to begin construction as early as 1993, with the system on-line by 1997 or 1998. We have already involved officials at the city, county and state level to insure support and understanding. Transportation is our acknowledged #1 problem. Since "first generation" super speed ground transportation technology such as the French TGV and the German Mag-Lev are on-line, it is a logical answer to this first phase effort. This project represents a golden opportunity for real progress in dealing with some of the worst transportation problems while beginning to address America's competitive position. It is time that we look to this technology and put our best minds to work to take it into the next century.

RECOMMENDATIONS

In conclusion, I would urge the Congress to move immediately to advance development of super speed ground transportation in the United States. Specifically, we need to:

1. Remove any obstacles to super speed trains' use of federally-assisted rights-of-way especially highways.
2. Provide incentives for, or otherwise facilitate U.S. industrial involvement in the fabrication as well as the construction of first-generation super speed train projects.
3. Build on last year's appropriation for "super speed fixed guideway activities" and commence research and development necessary and sufficient for America's entry into the "second-generation" market for super speed trains.

4.Provide inducements for U.S. industry to get involved in people-moving systems, which have been neglected for far too long.

5. Provide incentives for U.S. airlines to test the economic feasibility of switching to super speed trains for feeder services under 350 miles between city airports and to hubs.

6. Create a climate for economical operation of passenger trains by the private sector based on super speed trains. This may involve a new look at railroading statutes and regulations.

The commission appreciates the Subcommittee's interest in and support for objectives and projects like ours. I look forward to working with you in any way I may to move America into the forefront of super speed train technology.

TESTIMONY OF ELAINE L. CHAO

DEPUTY SECRETARY OF TRANSPORTATION

BEFORE THE

SUBCOMMITTEE ON SURFACE TRANSPORTATION

OF THE

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

UNITED STATES HOUSE OF REPRESENTATIVES

MAY 3, 1990

Mr. Chairman, distinguished members of the Committee, it is a pleasure to appear before this Subcommittee to testify on behalf of the Department of Transportation on one of the most interesting developments in transportation in recent years -- magnetically levitated high speed ground transportation or Maglev.

Just yesterday, I delivered the keynote address at a government-industry maglev forum which brought together a broad range of individuals to discuss issues associated with the development of maglev systems in this country. Participants ranged from members of Congress to some of our largest businesses and companies interested in developing maglev systems, to many of the scientists and engineers who were involved in the early maglev research and development, as well as others who will be needed to make maglev work in this country.

Congestion on our highways and at our airports is constraining intercity mobility such that economic growth may potentially be adversely affected. If maglev lives up to its potential, it offers one option to dramatically improve surface transportation mobility using a technology that is energy-efficient and environmentally sound.

Initial maglev systems might develop on a regional basis with distances up to 600 miles, absorbing excess highway and airline demand. High speed maglev systems, connecting regional airports as well as city centers, could provide an attractive alternative to short distance airline travel and could prove effective in relieving airport congestion.

There are basically two types of maglev systems being tested today. One works on the magnetic attraction principle where the vehicle underframe, which wraps around the guideway, is drawn up to within three-eights of an inch of the bottom surface of the guideway. The German Transrapid system, now nearing the end of its prototype testing, is an example of the attraction technology. The other, the Japanese Railways' prototype, works on the magnetic repulsion principle, pushing the vehicle 4-6 inches above the guideway. During the Department's early period of active maglev research and development (R&D), Germany, Japan and other countries now involved in maglev research shared the

products of our individual efforts. We can see the embodiment of much of America's and DOT's own R&D in both the German and Japanese prototypes.

Although both the German and Japanese systems are in the full scale prototype testing stage, no high speed maglev system is presently in revenue service. The Germans have approved construction of a revenue service line to connect the Bonn/Cologne and Dusseldorf airports, a distance of approximately 50 miles. The Japanese, however, have decided to undertake further prototype testing and are considering the construction of a prototype test track in the suburbs of Tokyo.

Both Secretary Skinner and I have visited Emsland, West Germany, to test ride the prototype Transrapid Maglev and meet with its designers. I have also met with State and local officials, and private investors who want to develop maglev systems in the U.S. DOT staff have also reviewed the Japanese prototype. We have come away from those meetings believing that maglev technology has the potential to play an important role in the Nation's transportation system.

Both the Germans and Japanese have made impressive advances in developing this technology, and there may be a potential for a U.S. designed, advanced maglev system that could become the system of choice for future high speed ground transportation

systems. The challenge for the U.S. is not to recreate existing technologies, but rather to foster a "second generation" technology. Development of this technology will be an expensive undertaking. The task before us now is to determine the appropriate role of the Federal Government in this development.

I will begin my testimony by describing the Department's role in maglev development, what we have done, what we are doing, and what we believe should be done in the future.

PAST DOT EFFORTS IN THE DEVELOPMENT OF MAGLEV

The Department's earliest involvement with maglev dates from the High Speed Ground Transportation Act of 1965. Under that Act, we funded a wide range of research into all forms of high speed ground transportation. The Department rapidly became a world leader in maglev research and along with the National Science Foundation sponsored research which produced scale model demonstrations of the maglev concept. Research by the Department led to the development of the linear motor, the motive power used by all current maglev prototypes. In 1974, a prototype linear induction motor research vehicle set a world speed record of 255.4 m.p.h. at the Department's Test Center in Pueblo, Colorado.

In recent years, the Department has funded feasibility studies by States considering high speed ground transportation systems and has been the catalyst for many efforts to define the potential

for such systems, providing both seed money and technical assistance. Prominent among these are advanced projects proposed for Florida, Texas, Ohio, California/Nevada and Pennsylvania.

Finally, enactment of the Rail Safety Improvement Act of 1988 [45 U.S.C. 431(a)], specifically made the Federal Railroad Administration (FRA) responsible for establishing and enforcing maglev safety standards.

THE CURRENT STATUS OF MAGLEV IN THE U.S.

A number of States have investigated the feasibility of high speed maglev systems, and some have concluded that private maglev systems are feasible. The Florida High Speed Rail Transportation Commission is in the second phase in its process for awarding a franchise to build and operate a maglev line between Orlando Airport and the nearby theme park area, approximately 14 miles away. This line, which could begin construction as early as next year, envisions employing the German technology and being financed by Japanese banks. Public and private interests in Pittsburgh recently announced plans for a detailed feasibility study of a 27 mile link between the city's downtown and its airport using Transrapid Maglev and for developing maglev manufacturing activity in the Pittsburgh area. The Transrapid Maglev is also likely to be a serious contender as the high speed ground transportation system to connect Las Vegas with the Los Angeles region.

CURRENT DOT MAGLEV-RELATED ACTIVITIES

As the agency responsible for the safety of maglev systems, the Department has initiated a major research and testing effort to ensure the safety of U.S. maglev systems. Research on the Transrapid system, the system proposed for the Florida project, is underway and is being accelerated to ensure that unresolved concerns with safety do not slow implementation. This work will evaluate the adequacy of the existing German safety standards covering this system, the compliance of the system with these standards, and the need for additional standards for operation in the United States.

FRA's initial safety research focuses on Transrapid and "attractive" maglev technology because it has been formally proposed for implementation in the U.S., but we also intend to cover "repulsive" levitation technology as represented by the Japanese design. Our first priority in these efforts is safety, and we are working with the developers of the systems to ensure that FRA safety standards and regulations are clear and timely so that they may be considered in future system design. We want safety built into the systems, not added later.

The Department is also assisting the Florida officials and developers in the State effort to facilitate the development of the proposed Maglev line near Orlando. Last week, representa-

tives of the Federal Aviation Administration and FRA met with representatives of the State, the Maglev system developer, and the Orlando International Airport to discuss means for assuring an effective coordination of the Maglev and groundside access systems at the airport. FRA is also assisting the State in exploring the environmental issues related to the proposed project, and will serve as the lead agency for preparation of any Federally required environmental documentation.

The Department is exploring the use of existing transportation rights-of-way, such as the Interstate Highway System and freight rail lines. Preliminary assessments by the Federal Highway Administration have indicated that the location of maglev systems in Interstate Highway median strips may be technically feasible in certain corridors where not otherwise constrained by horizontal curvature limitations. The Federal Highway Administrator currently has the authority to approve a request from a State to permit non-highway uses of Federal-aid highway rights-of-way. We are continuing to explore this issue and will work with interested parties to develop mechanisms to expedite the requisite approvals where highway segments can be used in a project.

At the direction of the Congress' Appropriations Committees, FRA is studying the feasibility of commercial maglev in the United States. That study will be completed in June 1990, and will

provide initial insights into maglev's market potential, the economic and technical feasibility of commercial maglev systems, and legislative and other institutional changes that would facilitate the development of U.S. designed and manufactured maglev systems.

Although the study is still in progress, it is clear that both current maglev systems are still in the formative stage with some bugs to be worked out, including the rather substantial capital costs. We believe that there exists an opportunity to improve on the existing technology and develop the second generation of maglev in this country that would become the system of choice in the 21st century.

FUTURE DOT MAGLEV ACTIVITIES

As you are no doubt aware, the President's budget request for Fiscal Year 1991 includes a request for approximately $9.7 million to explore the possibility of stepped-up U.S. efforts in maglev. This request includes $6.2 million for FRA and $3.5 million for the Corps of Engineers. Building on previous R&D and results of the current feasibility study, that program is designed to determine whether maglev has a role to play in the U.S. transportation system. Thus, the program will look at whether maglev is feasible, will aim to develop appropriate safety and operating standards, and will identify the remaining technologies that must be developed to achieve an efficient,

economically sound and environmentally acceptable U.S. system. The goal of the program is to facilitate private development of an operational maglev system in the United States.

To avoid possible duplication of efforts, Federal agencies with interests in maglev have established a mechanism to coordinate their efforts. The Maglev Executive Committee, composed of representatives of the agencies with a major interest in maglev will set policy and coordinate Federal maglev efforts. The committee is chaired by Federal Railroad Administrator Gil Carmichael, with Major General Patrick Kelly as co-chair, and includes J. Michael Davis, Assistant Secretary for Conservation and Renewable Energy of the Department of Energy and William G. Rosenberg, assistant administrator for Air and Radiation of the Environmental Protection Agency. The Department's contingent on this Committee demonstrates both the potential importance of Maglev and our renewed efforts to view transportation intermodally. In addition to Gil Carmichael, the Executive Committee includes Jeffery Shane, the Department's Assistant Secretary for Policy and International Affairs, Tom Larson, the Federal Highway Administrator, Admiral James Busey, the Federal Aviation Administrator, and Brian Clymer, the Urban Mass Transportation Administrator.

At the working level, the Federal Maglev Coordinating Committee is directing implementation of the programs and coordinating all

Federal maglev efforts. In addition to the agencies represented on the Executive Committee, NASA and the Department of Commerce are participating in these efforts so that we can take advantage of their specialized expertise.

The process is working well. I believe the combination of the Corps' expertise in public works with the Department's expertise in transportation and in maglev technology will lead to a thorough analysis and useful recommendations on the future of maglev in the United States. The recommendations, to be completed in early 1992, will lay out the potential for maglev and the steps necessary for the government and the private sector necessary to realize this potential.

The group's first joint endeavor is the Government-Industry Forum I spoke of earlier. At this Forum, we are describing the initial plans for Federal Maglev activities obtaining input from the private sector and beginning to develop the government-industry relationships that will be necessary for this effort to be a success. This Forum has brought together a wide cross-section of the people who will be needed to make Maglev work in this country.

The group's most important endeavor will be the development of a set of recommendations in mid-1992 on further maglev development. These recommendations will be based on results from a series of

technical and economic analyses. Until these results are known, prudence requires that we proceed with caution and avoid committing to a specific maglev development strategy.

The United States has a long history of scientific and technological breakthroughs that have permitted advances in transportation worldwide. The Department's Transportation Policy Statement builds on that expertise and supports a Federal initiative to assess the possibility of such a breakthrough with maglev. The Federal Government will serve as a catalyst in the process by supporting research and development of technical issues and working to ensure that regulatory and institutional barriers do not impede implementation of transportation options like maglev.

Maglev systems may offer an infrastructure alternative, an alternative with exciting possibilities. The Department is committed to seriously investigating maglev's potential, and to removing any regulatory obstacles to its development and implementation.

Mr. Chairman, this concludes my statement and I will be happy to answer any questions that the Subcommittee might have.

"AMERICAN THIRD GENERATION MAGLEV BY 1995"

STATEMENT
OF
DR. GORDON T. DANBY

CO-INVENTOR OF MAGNETIC LEVITATION TRANSPORTATION,
AND
SENIOR PHYSICIST, BROOKHAVEN NATIONAL LABORATORY

WITNESS FOR THE SUPERMAG COALITION

BEFORE THE SURFACE TRANSPORTATION SUBCOMMITTEE OF
THE HOUSE PUBLIC WOkKS AND TRANSPORTATION
COMMITTEE

HON. NORMAN Y. MINETA, CHAIRMAN

10 A.M. THURSDAY, MAY 3, 1990
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Mr. Chairman, thank you for the opportunity to express before this committee our concerns for the national interest in **Third Generation Superconducting Magnetic Levitation** systems of high speed and relating transportation issues.

First, I will address the present status of the foreign challenge as seen by my partner, James R. Powell and me.

Japan has commenced the first stage of a 300 mph principal corridor superconducting Maglev from Tokyo to Osaka. They could have built parallel to the route of their famed "Bullet" high speed rail train which runs near the shoreline, and which has been operating for 25 years. Instead they have chosen a much more expensive mountainous route, in order to open up their country. 60% of the 300 mile route will be in tunnels. The scope of this is awe inspiring.

They are applying more advanced concepts to this Tokyo-Osaka route than those used successfully at the first generation Miyazaki test facility. For this reason we have called this a second generation system and call our own ideas for a more advanced system appropriate to the U.S., third generation. From 1978 to the present at Miyazaki thousands of guest passengers were carried, speed records well above 300 mph were established, and many successful experiments were carried out such as simulating earth movements of the larger clearance guideway due to earthquakes.

Last August in Japan I heard first hand detailed reports about their very large scale and ambitious plans. Since then they have received official approval and have started the first stage. More recently we have heard that they in addition plan to have a thirty mile system from the airport to Sapporo, the capital of Hokkaido, operational in 1994. This second system will be the world's first commercial superconducting Maglev, finished several years before the much larger scale Tokyo-Osaka route. The technology no doubt will be exportable in a short time frame.

We have had dealings with the Japanese National Railway and its successors for at least 20 years. We admire the quality of their work, their determination and their long term commitment. We are personally gratified also that after extensive study and development they have chosen to develop concepts that we invented and patented

many years ago. As an aside, following our first publications, workers in this country and abroad developed variations which we chose to pass over, but which they claimed were superior. Evidently, the Japanese did not agree.

Meanwhile in Germany a test track demonstration system which also has carried thousands of guest passengers has also been successfully tested. This is an alternate approach to Maglev which they chose as requiring a shorter term development.

We and many others do not believe this approach has the potential of the superconducting electrodynamic suspension developed by the Japanese. Nevertheless, the German firms who have developed it have plans for export to the U.S., for example, the Orlando project. We believe that the Japanese system will prevail over the German approach, for two reasons: first, it is technically superior, and second, it has the very strong backing of the Japanese government and people.

Maglev is poised for commercial application worldwide, while the U.S. is still on the sidelines.

Assuming the Germans, like the Japanese, build an airport system in their own country in the next 3 to 4 years, both countries will have actual revenue service experience, to establish safety criteria, etc. in 5 to 6 years. This will permit formidable export policies in the absence of a U.S. alternative. If the U.S. does not move aggressively, Japan will dominate the world markets in this major future transport mode before 2000. Transportation is too large a fraction of the GNP for us to abandon the field to others.

Transport needs are very different in the U.S., with our dispersed population and industry. We should build third generation systems appropriate to our needs, economic and flexible in utilization and integrated with our existing highway dominated population and building patterns. We can leapfrog to the forefront if we start now on a 5 year construction program.

Maglev has the capacity for individualized vehicles and very fast electromagnetic switching. If integrated with the Interstates and railways the utility of Maglev is greatly enhanced. It can revolutionize mobility without disrupting our present modes of transport.

We have long advocated systems capable of moving heavy containerized freight at high speeds, in addition to passengers. This greatly enhances the economic viability of Maglev, expanding its utility beyond high population density corridors to much of the U.S. population as a whole.

Maglev has much greater potential for widespread beneficial use than high speed rail. Its capability for single vehicle operation, light weight vehicles and low cost track structures, very high speed operation, passenger and freight capacity, and the absence of the severe roadbed maintenance problems associated with rail, all make it extremely attractive. It will become a very high speed, dominant new transport component. However, it will be a "good neighbor" to existing transport modes.

What is required to build a 3rd generation Maglev by 1995? The technology has been in hand for years. There are no technical barriers to building Maglev. The basic generic technologies now exist scattered around in U.S. industry. What is required is a third generation design and the technical leadership to pull this together, plus the national will to push forward.

We believe the rapidly accelerating rate of commitment in Japan during the last year does not permit the time for prolonged studies. If private capital is to invest very large amounts of money in an actual Maglev system they need to believe the government is serious. Availability of rights of way which are economically attractive for first systems should be the major purpose of Federal and State Government support initiatives.

The great bulk of Government funding must go to support actual construction efforts by private U.S. enterprises who will undertake at their own risk the high tech R&D they deem is required. This will focus the development. Only 10 to 15% of the Federal funds can usefully go to R&D. This should be generic in nature, for example, high temperature superconductors.

We must minimize the present tendency in the U.S. to produce mountains of paper which in the end often have very little to offer to problem solving. In fact, a study oriented program with academic conferences will result in any good U.S. ideas being in the public

domain. They will be picked up and exploited by more serious foreign engineering efforts.

The circumstances are that Maglev is an engineering problem whose components are all within the state of the art, but with very few people with the background necessary for a fast track start.

Many people want to get into Maglev. Rather than study the problem to death, a new influx of future Maglev engineers should learn on the job, on actual construction projects. The broad base of skills will grow faster that way and U.S. competitiveness not suffer the additional great shock of falling further behind in important transportation technology. Bear in mind that vital as aircraft are to our society and its industrial competitiveness, airplanes are a 10% transportation component. Maglev is potentially a much larger industry, with an enormous impact on our wellbeing.

We urge that the Government facilitate new proprietary private enterprise systems that can be built in the next few years. Otherwise the "Boeings" of Maglev will not be in the U.S. and there will be a resulting loss of U.S. technical development, spinoff technology, derivative patents, and overseas markets. Serious Maglev enterprises should be prepared to put up at least 50% of the actual cost from their own funds for a first system, designed and built at their own technical risk with proprietary designs.

We believe that this philosophy not only will get us Maglev in a shorter time, but that it will be better Maglev. We caution very strongly, however, that U.S. government money not be used to build Maglev Systems dependent on foreign technology. If government money were to be spent on such systems, it would only serve to subsidize foreign competitors at the expense of long term U.S. interests.

Furthermore, they do not need this assistance. Maglev systems will be build in the next 3 or 4 years in Germany and Japan. These will provide operational experience and safety criteria using their own population at their own expense.

U.S. government funding for Maglev should focus on developing U.S. technology and fostering industrial competitiveness. If foreign Maglev technology systems are to be build in the U.S., they should rely totally on private capital and without hidden subsidies.

Our personal goal is to attempt to facilitate and participate in building by 1995 a working first link in a major corridor, based on a 3rd generation Maglev system that is suited in performance and economy of construction to eventually wide spread utilization in the U.S. We welcome competition from like minded people.

We are both from a big science academic background. I have personally been responsible for the building of many very large and very expensive accelerator devices and particle detectors. This included the building of the first superconducting magnet system actually inside a particle accelerator. This large magnet system was an unmanned turnkey operation which operated very successfully for many years after 1973. If the superconducting magnet did not work, the high energy physics programs stopped.

Jim Powell has also been associated successfully with many large scientific and engineering projects. Our professional lives have been devoted to building things of scientific significance, not just writing papers.

We would like to note our Maglev work has always been private, and on our own initiative, starting when we first shared a house in 1960. We have worked on Maglev in our spare time ever since. At the request of Senator Moynihan, and with the approval of Brookhaven National Laboratory management, we agreed to coordinate the Maglev study for the Environmental & Public Works Committee.

Finally, it is important to make it clear that if a U.S. Maglev effort is to succeed, the government must seek to facilitate large scale commitment in a near time frame. A small scale, study oriented program will not succeed. Even in the 1970s, at an earlier era when Maglev was more towards the R than the D, this funding approach did not work for the U.S. The large scale foreign technical achievements in Maglev were not affected by the small scale U.S. R&D effort.

Over a period of almost two years the SuperMag Coalition has been working with your colleagues and key staff. I am sure Mr. Shenefelt will be willing to assist further in specific legislative proposals.

Thank you for this opportunity to present our views.

STATEMENT OF

DONALD M. DEER

CHAIRMAN EMERITUS, HIGH SPEED RAIL ASSOCIATION

MEMBER, AMERICAN ROAD & TRANSPORTATION BUILDERS ASSOCIATION

before the

HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

SUBCOMMITTEE ON SURFACE TRANSPORTATION

Washington, D. C.

May 3, 1990

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STATEMENT OF DONALD M. DEER
CHAIRMAN EMERITUS, HIGH SPEED RAIL ASSOCIATION
MEMBER, AMERICAN ROAD AND TRANSPORTATION BUILDERS ASSOCIATION

before the

HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

SUBCOMMITTEE ON SURFACE TRANSPORTATION

Mr. Chairman and members of this distinguished Committee, on behalf of the High Speed Rail Association (HSRA) and the American Road and Transportation Builders Association (ARTBA), of which HSRA is a member, I am honored to have the privilege of submitting this statement to you today. With me here today is Dr. T. Peter Ruane, President of ARTBA.

As former chairman of the Organizing Group of HSRA, I helped found our Association seven years ago. At that time, in 1983, I was impressed with the commitment of our diverse group to a common goal of bringing the benefits of rapid, safe, and economical high speed ground transportation technologies to the United States. That dedication has never wavered, and today we stand on the verge of implementing brand-new high speed rail systems (both advanced wheel on rail and maglev) in this country to ease our worsening congestion.

At present, HSRA includes members of the financial community, the engineering and design profession, labor unions, the construction industry, rail equipment manufacturers and suppliers, maglev researchers, service providers, professionals, academia, and national, state and local agency employees. Our roster

includes, for the first time, an American aerospace company. Officials from every state high-speed commission belong to our organization, and we maintain a close working relationship with them.

HSRA has worked with the Congress to pass legislation enacted in 1988 to permit tax-exempt bonds to be used to finance high speed rail systems. Our current chairman, Mr. Paul H. Reistrup, former president of Amtrak, testified before the Senate Commerce Committee on behalf of HSRA last fall. Mr. Robert K. Pattison, vice chairman of HSRA, appeared before that same committee just over a month ago.

Mr. Chairman, lately interest in magnetic levitation transportation has grown exponentially in the Congress, the Administration, the media and the public -- a development we applaud. HSRA strongly supports these initiatives -- indeed, we support all efforts to commercialize both advanced wheel on rail and maglev systems in the United States.

But amidst the growing sentiment that we as a nation must invest in a "leapfrog" maglev research and development program in order to retain our world technological competitiveness, we must also continue to ensure the vitality of our transportation infrastructure that enables us to compete in the first place. As I will explain further in my testimony, plans are now underway in several regions of the country to implement existing high speed ground rail transportation technologies. These

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efforts, along with any new federal maglev research and development initiative, deserve the same manner of support by the federal government as that enjoyed by the air and highway modes.

Mr. Chairman, HSRA strongly believes that federal policies should encourage the immediate corridor implementation of advanced wheel on rail and maglev technologies which offer us the benefits now of reduced congestion, increased energy conservation, and lowered pollution. I believe it will be of considerable interest to this Committee that highway officials have begun supporting high speed train proposals. In Florida, state officials are concerned with the fast-growing traffic between Miami and Fort Lauderdale. They say that if nothing is done, 44 lanes of highway would have to be in place after the turn of the century to handle the traffic. Mr. Chairman, the land-use patterns simply do not allow a highway of that magnitude, and officials there say high speed rail is essential for future mobility. The Florida Turnpike is cooperating with the high speed train planners, expecting to share part of its right of way with advanced steel-wheel trains.

In Texas, that state's Turnpike Authority has been the inspiration behind the high speed network proposed there. Officials in Texas again cite highway capacity constraints, particularly in urban areas, as the justification for high speed trains. California and Pennsylvania are also voicing such views.

Mr. Chairman, states and regional authorities across the country are now seriously considering high speed ground transportation as an alternative to congested highways and airports. Let me describe just a few of the major high speed

projects across the country now approaching the implementation stage.

In Florida, the application of the Florida High Speed Rail Corporation for a franchise to construct an advanced wheel on rail line using ASEA Brown Boveri technology and connecting Tampa-Orlando-Miami continues under review by the Florida High Speed Rail Transportation Commission. This franchise award is targeted for September 1991. A separate proposal to construct a maglev demonstration line using Transrapid technology from Orlando International Airport to a tourist complex near Disney World is scheduled to open for operation in October 1994.

Construction of this maglev line will lead to further public support for American research and development in magnetic levitation trains. As U.S. maglev pioneer Dr. James Powell told Senate staffers not long ago, the Transrapid maglev, once built in Orlando, will boost demand for high speed trains around the nation.

In Ohio, the Ohio Railway Organization, a private industry consortium, was recently selected to prepare, in conjunction with the Ohio High Speed Rail Authority, a construction and operation plan recommending a specific high speed train technology connecting Cleveland-Columbus-Cincinnati, to be submitted to the Governor and Assembly in 1991.

In January 1990, the California-Nevada Superspeed Train Commission issued a request for proposals for a Las Vegas-Anaheim high speed route. Final responses are due in July 1990, with a

developer (either advanced wheel on rail or maglev) to be selected by late 1990.

Elsewhere in the country, high speed rail corridor initiatives are similarly advanced. Pennsylvania recently published a study recommending a Harrisburg-Pittsburgh maglev connection. Washington State is now reviewing the possibility of a 178-mile high speed rail connection from the present Seattle/Tacoma airport to a proposed new super-airport at Moses Lake, Washington, as the basis for a new regional system in the Pacific Northwest. Studies have also been completed or are in progress for Boston-New York, Minneapolis-Milwaukee-Chicago, Detroit-Chicago, and Los Angeles-Fresno-Bay Area-Sacramento high speed systems. Only a few weeks ago, new high speed train legislation was introduced in the Colorado legislature.

The recent formation of MAGLEV, Inc., a public/private consortium based in Pittsburgh and led by Carnegie Mellon University, is among the most exciting of these initiatives. By creating a new manufacturing and construction industry in Pittsburgh, MAGLEV, Inc. intends to revitalize the industrial infrastructure of all of Allegheny County. The initial objective of the consortium will be to build and operate a 19-mile maglev demonstration project linking downtown Pittsburgh and the new midfield terminal being constructed at the Greater Pittsburgh airport. MAGLEV, Inc. is the first public/private venture in the United States dedicated to the manufacture and production of high speed technology.

These efforts represent a groundswell of emerging support across the United States for high speed rail and its potential to help ease our congested air and highway transportation modes. Members of HSRA, who are actively involved in every one of these proposed projects as planners, administrators, or participants, above all recognize the environmental benefits in terms of clean air and energy savings to be gained from implementing a new electrically-based system of transportation encompassing both advanced wheel on rail and maglev technologies.

We wish to make it clear that this Association supports all types of high speed ground transportation, whether French, German, Swedish, Japanese, or Canadian technologies, or a U.S.-designed second or third generation maglev system. It is with this perspective -- as proponents of all high speed ground transportation technologies and applications -- that HSRA offers the following comments on a number of legislative proposals advancing high speed ground transportation now pending before the Congress.

HSRA advocates, where safety permits and economically feasible, use of federal interstate highway right of ways for all high speed ground transportation technologies. Accordingly, HSRA urges that the provisions of S. 221 as introduced by Senator Moynihan be broadened to permit such use by advanced wheel on rail as well as maglev systems.

As set forth in HSRA's testimony before the Senate in March, HSRA supports the federal loan guarantees for high speed rail systems contemplated by S. 1898, introduced by Senator Reid. As noted in that testimony, however, HSRA believes that the

federal guarantees of S. 1898 should be expanded to include short-distance demonstration systems, and that a least a portion of the guarantee authority be made available to other qualified systems regardless of origin of manufacture. HSRA likewise supports H.R. 4515 extending similar federal loan guarantees, introduced by Representative Walgren, but believes that the guarantee authority in that bill should also be extended to accommodate high speed rail demonstration systems whether manufactured in the U. S. or elsewhere.

HSRA supports Representative Hayes' resolution, H.Con.Res. 232, expressing the sense of the Congress concerning the need to examine the potential contribution of maglev systems to U.S. transportation infrastructure and world competitiveness. To that end HSRA endorses the funding proposals for maglev research contemplated both in S. 2286, the Magnetic Levitation Transportation Act of 1990, introduced by Senators Hollings and Exon, and H.R. 4549, the Magnetic Levitation Transportation and Competitiveness Act of 1990, introduced by Representatives Mrazek and Hochbrueckner. HSRA also supports the legislation proposed by Senator Specter providing a 10 percent tax credit for qualified advanced wheel on rail and maglev properties and systems.

HSRA believes federal policies should support implementation of all types of high speed rail systems, whether maglev or high speed trains, because:

- High speed rail is needed now to alleviate our crowded highways and airports. The President's national transportation policy recognizes the danger to our economic well-being from this congestion, and specifically recommends introduction of

high speed rail to the United States as a way of keeping our transportation industry strong and competitive.

- Substantial plans for implementation of high speed rail are already underway across the country. Many of these projects, as highlighted earlier, are significantly advanced along the hard path to implementation, construction and operation. Federal support in the form of loan guarantees or other assistance would provide the final piece to the financial mosaic that in some proposals has taken the private sector a decade and millions of dollars to assemble.

- For every high speed rail project now under consideration, direct and indirect infrastructure costs account for approximately 80 percent of the capital investment required. High speed rail rolling stock and trainsets account for at most 20 percent of the total capital investment. Thus, the vast portion of the new economic development, construction activity, and employment generation accompanying any of the $2 to $5 billion high speed rail projects now under consideration will take place entirely in the United States. And, as the Pittsburgh initiative develops, and relationships of foreign technology suppliers with other domestic manufacturers expand, high speed intercity rail trainsets could be assembled in this country even as the domestic maglev technology manufacturing program beings to energize.

HSRA asks only for an unjaundiced appraisal. As a nation, we have made a substantial federal commitment to building and supporting our highway and air modes, and our railroads, to move people and goods from place to place. HSRA believes that it is critical to our collective future to maintain and nurture that investment.

At the same time, however, increasing gridlock and "winglock", and escalating environmental concerns, demand that the federal government promote a transportation alternative that is

environmentally sound and economically efficient. That alternative is high speed ground transportation.

In order for us to meet the crisis of congestion we now face, federal policies must explicitly encourage and support new solutions in transportation -- solutions such as maglev and high speed trains. Only in this way can we meet the challenges of the future.

Mr. Chairman, we appreciate the opportunity to submit this statement. HSRA and ARTBA would like formally to extend an invitation to you and the members of the Subcommittee to visit with us at HSRA's seventh annual international convention, to be held next week, May 7-10, 1990 in San Antonio, Texas. We expect attendees from 15 countries around the world, including the Soviet Union.

Thank you very much, and I would be pleased to attempt to answer any questions you may have.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

KERMIT H. JUSTICE, President
Secretary
Delaware Department
of Transportation

FRANCIS B. FRANCOIS
Executive Director

STATEMENT BEFORE THE

SURFACE TRANSPORTATION SUBCOMMITTEE
OF THE
HOUSE PUBLIC WORKS
AND TRANSPORTATION COMMITTEE

relating to

THE DEVELOPMENT OF HIGH-SPEED TRANSPORTATION CORRIDORS

by

Francis B. Francois,
Executive Director

American Association of State Highway
and Transportation Officials

May 3, 1990

Founded in 1914, AASHTO represents the departments concerned with transportation and highways in the fifty states, the District of Columbia and Puerto Rico, to foster the development, operation and maintenance of an integrated national transportation system. The active members of AASHTO are the duly constituted heads and other chief directing officials of the member transportation and highway agencies.

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Mr. Chairman, my name is Francis B. Francois, and I am the Executive Director of the American Association of State Highway and Transportation Officials, known as AASHTO. I am pleased to respond on behalf of AASHTO to your invitation, seeking our Association's views on development of high-speed transportation corridors, and a number of bills introduced in the House and Senate pertaining to magnetic levitation transportation, commonly called maglev.

In my testimony I will first outline AASHTO's views on high-speed surface transportation, and then provide some general observations on high-speed rail and maglev, followed by comments with respect to certain bills pending in the Congress. Finally, I will discuss some concerns with regard to proposals for placing maglev facilities along the right-of-way of our system of Interstate and Defense Highways.

AASHTO's Recommendations

Mr. Chairman, you are aware that AASHTO is increasingly concerned with transportation in all modes, including rail. We have provided this Committee with copies of our "New Transportation Concepts for a New Century" AASHTO report, which includes our recommendations for the aviation, highway and public transportation, rail and water modes of transportation, in addition to recommendations on transportation research and intermodal transportation. We believe that if America's transportation needs into the next century are to be met, then we will increasingly need to rely on all transportation modes, that improvements and new technology will be important in all modes, and that we must direct increasing attention to the movement of both people and freight intermodally.

Looking at the surface transportation corridors that serve to link the States, regions and major cities of our nation, the Interstate and Defense Highway system now carries some 20 percent of the nation's traffic. It is the backbone of our freight system, moving on trucks that criss-cross the nation every day. It provides access by automobile for millions of Americans. In addition, the railroad system that helped build our nation continues to be a vital part of our transportation system. While thousands of miles of branch lines have been abandoned, our railroad trunk lines function to move not just bulk commodities, but increasingly move containerized freight between, to and from our ports. AMTRAK continues to provide rail passenger service, and has strong support from the public.

Vital as these surface transportation corridors are, they all operate at speeds below 100 mph. They are not "high-speed," which is considered to be in the range of 100 mph to 300 mph. The purpose of this hearing, as we understand it, is to address such high-speed corridors, a subject in which there is much interest today at all levels of government and in the private sector. Since it is not likely that highway transportation can provide such high-speed operations, the focus is on high-speed rail.

Within AASHTO and the States that comprise the Association, there is much interest in high-speed rail. Several States, including Florida, Ohio, California, Nevada and others have been looking at high-speed rail for some time. Texas is now engaged in examining the prospects for high-speed rail between Dallas, Houston, Austin and San Antonio. Most recently, under the leadership of Commissioner Leonard Levine of the Minnesota Department of

Transportation, the States of Minnesota, Wisconsin and Illinois have announced a study of high-speed rail transportation between Minneapolis and Chicago, in part as a possible relief to the airports serving these cities.

In our "New Transportation Concepts for a New Century" report the association presents recommendations on the direction of the nation's surface transportation program, and for our National Transportation Policy. The report specifically addresses high-speed rail, stating:

> "AASHTO believes that the Federal Government should support and participate in a public-private partnership to develop high-speed rail in those selected corridors in which it will demonstrably relieve highway and airport congestion, and improve intercity travel efficiency. Any comprehensive national transportation program must address rail passenger service needs."

AASHTO does not have a policy position related directly to maglev. We do, however, have positions pertaining to the various concepts of issues contained in bills pending in the Congress about maglev.

AASHTO reviewed the issue of high-speed passenger service as an integral part of our Transportation 2020 Program. The results are reported in our "Railroad Industry Prospectives" report, copies of which have been furnished to the Committee. It should also be noted that U.S. DOT's recently released National Transportation Policy report, "Moving America," (pages 102-106) supports the need to advance U.S. transportation technology and expertise and proposes a major new initiative in transportation research and technology to promote research activities for high-speed rail as well as other modes. Similarly, in our Transportation 2020 report on research, titled "Innovation" copies of which have been provided to the Committee, AASHTO is supportive of transportation research in all modes, including high-speed rail.

Looking intermodally, AASHTO believes we must do more to properly interlink the several modes. In our 1988 "The Bottom Line" report, copies of which have also been given to the Committee, we identified an annual need to invest about $1 billion in such intermodal connections between now and the year 2020. The Association believes that priority should be given to access by highway and public transportation modes to ports, terminals and other modal facilities. Also, planning should insure that decisions to locate ports, terminals and other modal facilities include adequate consideration of existing and future surface transportation requirements.

Looking across our transportation system, in our "New Concepts" report AASHTO supports similar priorities under our National Modal Objectives as U.S. DOT's National Transportation Goals, of addressing urban congestion, preserving existing service through reconstruction and maintenance, and providing mobility for the non-driving public by public transportation services. High-speed rail should be considered as a possible mode in fulfilling these objectives.

AASHTO believes that intermodal links for a number of corridors are necessary in fulfilling these objectives. For example, it has recently been announced that Midway Airlines and Amtrak have devised a joint marketing scheme to provide Atlantic City, New Jersey with direct rail service to and from the Philadelphia International Airport. A single ticket provides for

service on both modes and baggage can be checked between the modes. This agreement provides for using SEPTA's (Southeast Pennsylvania Transportation Authority) rail line from the Philadelphia 30th Street Railroad Station to the Philadelphia International Airport and the newly renovated Amtrak line between 30th Street Station and Atlantic City. AASHTO believes that innovative service such as this helps achieve the goals of relieving congestion and pollution without the necessity of incurring large construction costs. This innovative service is also another example of the necessity to examine the various alternatives to relieving a problem in preference to predetermining the use of a particular technology. In this regard, I am sure that Mr. Smith, from the Florida High-Speed Rail Commission, who is here today, will confirm that the sequence of their activity was to first define the problem and the prospective ridership, then to determine a method of financing, route selection, and finally the technology to be employed.

High-Speed Rail and Maglev

Mr. Chairman, AASHTO's support for high-speed rail is not related or limited to any particular type of technology. We believe in the concept of a need for high-speed rail passenger service, and believe that the technology used should be dependent upon its feasibility applied to a particular service. That is, we believe there will be instances where trains powered by diesel electric engines would be the most practical for a particular route, while in other corridors maglev may be the best answer.

Diesel electric technology is presently in use on the Northeast Corridor between Washington and New York to provide high-speed rail service, with the trains attaining speeds of 125 mph. There will be other instances where electric powered vehicles would be best suited for a particular operation. For example, the French operate the TGV (Tres Grande Vitesse, meaning very high-speed train) on a 236 mile route attaining speeds of 168 mph. Using a similar technology the Germans plan to operate the Intercity Express commencing in 1991 at speeds between 155 and 186 mph. The French recently demonstrated with their TGV that these trains can attain speeds of 300 mph, which is equivalent to speeds projected for magnetic levitation. It has been found by TGV, however, that the maximum speeds are not practical for normal revenue operations. Part of the reason the TGV is not operated at higher speeds, we are told, is that passengers are uncomfortable at the higher speeds.

When thinking in terms of high-speed passenger rail service, we tend to compare it to aircraft travel, which may be at over 500 mph, with no passenger discomfort. But an airplane moving at 500 mph plus is usually also at 30,000 feet in altitude, where there is no sensation of speed. Moving at 300 mph at ground level gives a very different sensation to the traveller, as the French have found.

Mr. Chairman, in their analysis of high-speed rail options, some consultants believe that the TGV technology is preferable to maglev technology, because the large cost differential between the two technologies does not justify the small difference in overall running time of the trains. These consultants have found that TGV is more profitable on routes of 200 miles or longer, whereas maglev is profitable only for routes under 150 miles. There is a need in each projected high-speed rail corridor to carefully analyze the cost-benefit situation, before choosing a specific technology.

Pending Bills in Congress

Mr. Chairman, as the Committee is aware, there are a number of pending bills in the Congress that address high-speed rail, and in particular maglev. The common thread of these bills is that they support extensive research into the practicality of maglev in the United States, both technically and from the cost-benefit approach.

Looking first at the other body, of particular interest is S.221, introduced by Senator Daniel Patrick Moynihan, which directs the Secretary of Transportation to prescribe regulations under which the States will be allowed to use rights-of-way along Federal-aid highways for the construction of magnetic levitation systems as part of the Federal-aid highway system, with particular emphasis on the extent to which such systems affect all aspects of building and maintaining such highways. This bill was reported out of the Senate Committee on Environment and Public Works on April 24, 1990, and should be of particular interest to the Committee since it deals specifically with the issue of locating maglev along the right-of-way of our Interstate and Defense Highways.

Other Senate bills of interest include S.2286, introduced by Senator Ernest Hollings, which provides for an interagency cooperative effort in research and development of maglev. It would establish a high-speed ground transportation office and authorize an appropriation of $50 million each for fiscal years 1991 and 1992 to carry out the provisions of the act relating to magnetic levitation transportation. This bill was reported out of the Senate Committee on Commerce, Science and Transportation on April 3, 1990. Also, S.1898 introduced by Senator Harry Reid provides for a magnetic levitation pilot project program.

Also of interest is S. 1630, the Senate's Clean Air bill. Section 226 on page 289 of the reported bill calls upon the Administrator of the Environmental Protection Agency to make an analysis of the health and environmental aspects of magnetic levitation technology, and to report to the Congress and the President not later than six months after the date of enactment of Clean Air legislation. This mandate to EPA appears to extend beyond Clean Air, but this is not clear and may be an issue that this Committee will want to address, as I will comment on later.

Turning to the House, Mr. Chairman, H.R.4515 introduced by Congressman Doug Walgren provides $10 billion dollars in Federal loan guarantees for the development of magnetically levitated and high-speed rail technology and would authorize an appropriation to the Federal Railroad Administration for $10 million to conduct a study examining the feasibility of high-speed rail in the United States. H.R.4549 introduced by Congressman Robert Mrazek would establish a Magnetic Levitation Transportation Administration within the DOT. It authorizes an appropriation of $350 million for the purpose of conducting a national competition to award grants to participants for research and development to design a magnetic levitation transportation system. It further provides for granting $600 million to a State government, local government, organization consisting of State and local governments, or consortia of private businesses for the purpose of constructing a magnetic levitation transportation system of at least 40 miles in length.

The House also has pending H. Con. Res. 232, introduced by Congressman Jimmy Hayes. It calls for Congress to examine the contribution maglev could make to the transportation and world competitiveness of the United States.

Also, as you are aware, Mr. Chairman, U.S. DOT is undertaking a study of maglev. In fact it is conducting a symposium on the subject this week. The current Federal budget proposal for FY 1991 provides $10 million for maglev research.

There appears to be some disagreement as to the role of Federal agencies in maglev, as between the U.S. Department of Transportation and its Federal Rail Administration, and the Army Corps of Engineers. The various pending bills do not make clear who is to lead the Federal government's role in high-speed rail and maglev, and this is an issue this Committee may also want to address.

Maglev and Interstate Highways

Mr. Chairman, let me now turn specifically to proposals for placing high-speed rail, and in particular magnetically levitated trains, along the rights-of-way of Interstate highways. In that regard we would raise a number of cautions, some of which are addressed in S. 221, as reported. Section 1 of S. 221 provides that the Secretary of Transportation "shall approve a request to allow magnetic levitation facilities to use and otherwise occupy the right-of-way of a Federal-aid highway project," and thus is not limited just to Interstate and Defense Highways. Section 1 then includes this proviso, which goes to the heart of our concerns:

> "Provided, that such use will not impair the safe and efficient use, operation, maintenance, rehabilitation, and reconstruction of such highway project."

Mr. Chairman, there are at least four areas where some cautions need to be stated, when considering the construction of maglev or other high-speed rail facilities in highway rights-of-way, and especially rights-of-way of our high-speed highways such as the Interstate and Defense Highway System. These cautionary areas include: (1) the legality of using highway right-of-way for high-speed rail; (2) construction and maintenance of high-speed rail on limited access highways; (3) highway safety impacts; and (4) environmental impacts.

Legality of Right-of Way Use

It needs to be remembered that highway rights-of-way are owned by the States or their local governments, not the Federal government. In some instances rights-of-way are obtained through negotiation, and sometimes limitations are placed on the usage of the right-of-way property by the grantor. In other instances rights-of-way are acquired through the exercise of the State or local government's eminent domain power, in judicial condemnation proceedings. Condemnation procedures in some States and local governments can place strict limitations on the purpose for exercising eminent domain, which can thereafter restrict the use of the condemned land to specific purposes. This can be true regardless of whether or not Federal funds were employed to help build the highway or road.

In analyzing any proposed high-speed rail or maglev corridor along a highway right-of-way, a part of the analysis should include a detailed examination of the status of the right-of-way, to determine if there are legal impediments to usage of the right of way for the facility.

In an effort to take a look at the overall situation regarding limitations on the use of highway rights-of-way for maglev purposes, AASHTO and the FHWA have recently undertaken a brief general survey. The first survey question is:

"Does current State law permit multiple use of highway right-of-way for other transportation purposes, e.g. Maglev Systems?"

The States were asked to reply "yes" or "no", and 24 responses have been received as of April 27. In responding, many States have included qualifications that would need to be reviewed in detail to obtain a truer picture. Looking only at the "yes" and "no" responses received to date from 24 states, however, the survey identifies several potential right-of-way problems for maglev.

To date, the following States responded "yes" or "no" to Question one:

"Yes"

California	Minnesota
Connecticut	Mississippi
Florida	Nevada
Illinois	New Jersey
Indiana	Ohio
Kansas	Oregon
Kentucky	Virginia
Maryland	Washington
Michigan	Wisconsin

"No"

Arkansas	New York
Idaho	North Carolina
New Mexico	Wyoming

AASHTO, U.S. DOT and others supporting high-speed rail do so with the assumption that it will be built and operated by the private sector. This raises yet another right-of-way issue: can State or local government highway right-of-way be used for a private sector, presumably profit-making activity?

To take a look at this issue, the AASHTO-FHWA survey included the following second question:

"Does current State law permit commercial activities within highway right-of-way?"

As of April 27, the following responses were received, and again in several instances substantive explanations were offered that have not been analyzed in detail:

"Yes"

California	Minnesota
Connecticut	Nevada
Illinois	New York
Indiana	Ohio
Kentucky	Oregon
Maryland	Washington

"No"

Arkansas	New Jersey
Florida	New Mexico
Idaho	North Carolina
Kansas	Virginia
Michigan	Wisconsin
Mississippi	Wyoming

Again, it is emphasized that there are a number of qualifications on these "yes" and "no" answers, to both questions posed in the survey. Also, only about half of the States have responded so far. But from the answers received, it is clear that the possible use of highway right-of-way for high-speed rail or maglev purposes may involve a number of legal problems. While most or all such problems may be solvable in a given State, the legal status of rights-of-way should clearly be included in any analysis made of using such rights-of-way for maglev or other high-speed rail facilities, especially if they are to be operated by the private sector.

Limited Access Highways and Maglev

The use of our Interstate and Defense Highways for maglev or other high-speed rail facilities also raises issues with regard to the entry onto the right-of-way, because of the limited access nature of our Interstates and special rules that control such access.

The general policy with regard to access on freeways is guided by an AASHTO publication titled "A Policy On the Accommodation of Utilities Within Freeway Right-Of-Way," and copies of this Policy are being submitted with this testimony. While AASHTO has no authority to impose this or any other Policy on the States and local governments, it is nevertheless commonly enforced by the States and is employed by the Federal Highway Administration to guide its actions in this area. This Policy was recently re-written in 1989, and adopted by more than a two-thirds vote of all the States. It would clearly apply to a maglev or high-speed rail installation, in the same manner as to other utilities.

The Policy addresses all utilities that want access to a freeway, and it strongly discourages any longitudinal installations (page 3). If anyone makes a request to the State or local government owning the freeway that follows this AASHTO Policy, the request must show:

"A. That the accommodation will not adversely affect highway and traffic safety.

B. That alternate locations are not available or cannot be implemented at reasonable cost, from the standpoint of providing efficient utility services in a manner conducive to safety, durability, and economy of maintenance and operations; that the accommodation will not adversely affect the design, construction, operation, maintenance, or stability of the freeway; and that it will not interfere with or impair the present use or future expansion of the freeway.

C. That disapproval of the use of the right-of-way would result in the loss of productive agricultural land, or loss of productivity of agricultural land, if any. In this case, the utility must provide information on the direct and indirect environmental and economic effects of such loss, which effects will be evaluated and considered by the highway agency.

D. That the accommodation satisfies the conditions of Item 7, "Access for Constructing and/or Servicing Utilities."'

The Item 7 referred to is contained on pages 8 and 9 of the Policy, and addresses specific concerns about doing construction and maintenance work within the freeway right-of-way. Other sections of the Policy would also be applicable to any maglev or high-speed rail facility in a freeway.

The Policy was adopted because of the special nature of freeways, which can carry very high volumes of traffic at high speeds, and where major accidents can be caused if drivers encounter unexpected obstacles. In addition, it is recognized that many of our Interstate and other freeway facilities will need to be widened over the coming years, and that adequate right-of-way to accommodate such widening must be preserved.

Again, it is possible that in given situations the concerns expressed in this AASHTO Policy can be resolved. But before any specific maglev or other high-speed rail corridors involving freeways are seriously considered, the matters addressed in the Policy must be considered and discussed with the State or local government owning the highway.

Highway Safety Issues

Proposals to place high-speed or maglev trains longitudinally in the right-of-way of city streets or low volume, low speed roads may not create safety problems in many situations, although there can be exceptions. Looking at Chicago and New York, elevated trains have been commonplace for generations along city streets.

The situation can be very different, however, when high-speed or maglev trains are placed longitudinally in the right-of-way of a high-speed freeway, such as an Interstate highway. Highway safety experts agree upon the desirability maintaining a so-called clear zone, or unobstructed recovery area, in the median strip and along the edges of such high-speed highways, to allow room for vehicles leaving the roadway to either recover and return to the pavement or to run a reasonable distance before colliding with an object.

One of the leading reports on maglev high-speed rail was released in June, 1989, titled "Benefits of Magnetically Levitated High-Speed

Transportation For The United States." The report was prepared by the Maglev Technology Advisory Committee reporting to the Senate Committee on Environment and Public Works, and was published by Grumman Corporation. A copy of the cover of this report is attached to my written testimony, and the artist's rendering thereon illustrates better than any words the concern that placing maglev high-speed trains longitudinally in freeway rights-of-way can generate. I am also filing with my testimony a copy of pages 15-19 of this report, titled "Maglev and the Interstate Highway System," which contains a good discussion of some of the issues involved with utilizing Interstate highways as rights-of-way for maglev high-speed rail.

The attached text of the maglev report suggests that the twin concrete tracks for the maglev train be mounted either in the median strip or along the edge of an Interstate highway, on piers erected perhaps 50 to 100 feet apart (page 17). As the text describes, it is probable that the tracks supported on the piers would be elevated up to 40 feet high, or perhaps more, to help assure avoiding a roller-coaster ride when clearing bridges and other obstacles. This type of construction raises two safety questions, the first being the impact of the piers on vehicle and driver safety, and the second being the impact of vehicles on the piers and thus the safety of the high-speed trains.

Taking up the latter safety question first, it needs to be understood that while heavy truck-and-trailer configurations are supposed to travel at 55 to 65 mph and weigh in at about 80,000 pounds gross weight, some such heavy vehicles do travel at much higher speeds and can weigh much more, perhaps 50 percent more. The impact of such a heavy truck colliding with one or more piers would need to be taken into account in the design of the pier and track structure, if the piers are located sufficiently close to the pavement for such collisions to occur.

With regard to the first safety question, some discussion of the clear zone concept is in order. There are two AASHTO publications that bear on this situation, the first being a brief document titled "A Policy on Design Standards-Interstate System," which was last revised in December, 1988. A copy of this Policy is enclosed, and the following is quoted from the section titled "Horizontal Clearance to Obstructions" found on pages 5 and 6:

> "A recovery area clear of unyielding objects should be provided. When provision of such an area is not practicable, any unyielding objects within its limits are to be made breakaway or are to be shielded by installation of crashworthy barriers or attenuators. Similarly, to the extent practicable, the pier and abutment supports for another highway or for a railroad overpass structure should be designed to provide a lateral clearance equal to the clear recovery area."
>
> "The width of the clear recovery area is to be commensurate with the selected design speed and roadside conditions. The width is to be determined through application of currently accepted procedures. In restrictive areas, it may be necessary to construct barriers, walls, piers, abutments or other unyielding objects nearer to the traveled way than the width required for a clear recovery area. The minimum lateral clearance from the edge of the through lanes to the face of such objects shall be the shoulder width with appropriate crashworthy barriers and attenuators."

As to the preferred design of clear zones or recovery areas along our Interstate highways and other freeways, this is addressed in detail in another AASHTO publication, the "Roadside Design Guide." Published in 1988, it is widely utilized by federal, state and local government design engineers. The Guide is rather bulky, Mr. Chairman, and accordingly only one copy is being filed with the Committee. If more copies of the Guide are desired, however, we will be pleased to provide them.

Chapter 3 of the Guide is titled "Roadside Topography and Drainage Features." Section 3.1 of this Chapter is titled "The Clear Roadside Concept," and section 3.3 is titled "Application of the Clear Zone Concept." Taken together, these two sections of Chapter 3 describe the safety concerns involved with providing clear zones. Beyond this, other Chapters of the Guide contain information and guidance that are pertinent to the situation.

Section 3.1 traces the history of the clear zone concept from 1960, through the AASHTO "Yellow Book" of 1974, and on to development of this 1988 Guide. Section 3.3 describes the detailed analysis process for determining a suitable clear zone, which will vary depending upon topography, slopes and many other factors.

Mr. Chairman, the clear zone or recovery area issue with respect to our Interstate highways and other freeways is an important highway safety consideration, one that needs to be taken into account in any proposed high-speed rail installation along or adjacent to such roads. It may be that with proper design acceptable locations for pier-supported, high-speed trains can be found along some sections of these roads; but it also needs to be recognized that no acceptable solution may exist in other locations. We suggest, Mr. Chairman, that this is an important issue within the jurisdiction of the Committee.

Maglev and the Environment

Mr. Chairman, the report prepared by the Senate's Maglev Technology Advisory Committee addresses a number of important environmental issues in the section on "Maglev and the Interstate Highway System" which I have filed with my testimony. We are pleased to see that some of these matters are being considered and investigated.

Looking at today's, and especially tomorrow's, highway and the vehicles that operate on it, Mr. Chairman, we would like to highlight one possible environmental concern for the Committee that we feel has not yet been fully reviewed. Specifically, the impact of the magnetic propulsion system, if any, on highway and vehicle electronics.

We understand that some maglev propulsion systems generate little if any external magnetic field, while other technical approaches to maglev generate higher levels. The reason we believe the impacts of such magnetic fields should be examined is because of the increasingly large use of electronic fuel injection equipment and computers in automobiles and trucks, to control the fuel system and for other purposes. This use of electronics and computers in our highway vehicle fleet will increase sharply in the years ahead, we are told. We need to be certain that the passage overhead or nearby of a high-

speed maglev train will not have a detrimental impact upon vehicle electronics and computers, especially any impacts that might cause accidents.

Beyond today's computers and electronics, Mr. Chairman, this Congress, U.S. DOT, AASHTO and the private sector are now engaged in efforts that may lead to extensive use of what is referred to as Intelligent Vehicle/Intelligent Highways, or IVHS, technology. IVHS systems may include Advanced Traveler Information Systems and Advanced Traffic Management Systems in the next decade or so, and may possibly be extended to Advanced Vehicle Control Systems after the year 2000 that will automatically control vehicles on our highways, at least in urban areas. The possible sensor and communication technologies that may be employed in IVHS need to be weighed environmentally against proposed magnetic levitation systems for high-speed trains, to see if both can exist longitudinally in the same narrow highway corridor.

Mr. Chairman, we are pleased to see that the Senate recognizes that maglev technology needs to be examined from an environmental viewpoint, as is evident from Sec. 226 of S. 1630. The Committee may want to review and suggest amendments to this Section of S. 1630, either as part of your consideration of H.R. 3030 or separately, to help assure that magnetic levitation systems are environmentally compatible both with the highway system of today, and the probably much more electronically-impacted vehicles and highways of coming decades.

Summary

Mr. Chairman, let me again state that AASHTO is supportive of high-speed rail, in those instances where it offers benefits to meet America's mobility needs. We believe, for example, that conventional or maglev high-speed rail technology might well be a solution to air traffic congestion in corridors of 300 to 500 miles in length, a solution that could free-up airport capacity now used in these short-haul corridors that could then be used for longer flights. We suggest, Mr. Chairman, that it may be desireable to do alternative airport/high-speed rail studies in corridors like Washington-New York-Boston and San Diego-Los Angeles-San Francisco.

As I have outlined, Mr. Chairman, we do have some concerns about proposals to place maglev trains longitudinally in the right-of-way of Interstate highways and other high-speed freeways. We believe those concerns need to be taken into account, as Congress and all other parties consider such proposals.

Mr. Chairman, let me say again that we are pleased to respond to the Committee's request for us to provide testimony on the subject of this hearing. I hope that our comments are of use to the Committee. I will be pleased to respond to question, now or in writing later.

# # # #

A Policy On the Accommodation Of Utilities Within Freeway Right-Of-Way

Prepared by the
AASHTO Standing Committee on Highways

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A Policy on the Accommodation of Utilities Within Freeway Right-of-Way

INTRODUCTION

The Geometric Design Standards for the National System of Interstate and Defense Highways adopted by the American Association of State Highway Officials on July 12, 1956, and accepted by the Bureau of Public Roads on July 17, 1956, provide, in accordance with Section 109 of Title 23, U.S. Code, Highways, 1958, for control of access on all sections of the Interstate System. These provisions were established to provide for the maximum degree of safety and to preserve the traffic-carrying capacity, both of which are warranted by the large public fund investment in the facility. There are also other freeways with similar control of access features which are not part of the Interstate System.

Control of access can be materially affected by the extent and manner in which public utilities cross or otherwise occupy the highway right-of-way. The highway agencies have various degrees of authority to develop and maintain control of access and to regulate utilities, generally through their authority to designate and to control the use made of right-of-way acquired for public highways, including those of all freeways. Their authorities depend upon State laws or regulations. These laws and regulations differ in the several States and may be different in a State for highways utilizing existing right-of-way and for highways on new location for which right-of-way is to be acquired. A State may also have separate laws and regulations different from those applicable statewide, for highways on right-of-way subject to jurisdiction of a local government such as that of a large city.

In order to carry out the intent of Title 23, U.S. Code, a uniform policy is needed to establish the conditions under which public and private utilities may be accommodated on the freeway right-of-way. The following statements constitute such a policy. While the policy has as its primary purpose increasing and maintaining high-

way safety and function to the maximum and insuring uniformity of utility treatment among the States, it recognizes the public interest in avoiding unnecessary and costly operation of public utility organizations. The policy applies to all highways with full control of access, regardless of system. Also, it has value as a guide for all highways with partial control of access. For highways without control of access refer to AASHTO's *A Guide for Accommodating Utilities on Highway Right-of-Way*. The policy can be applied in most States by existing authority. Those States in which laws will not permit the application of this policy in its entirety should strive for uniformity through the enactment of appropriate legislation.

It is not the intent of this policy to impose restrictions on the future installations of utility crossings to the extent that would obstruct the development of expanding areas adjacent to the freeways.

This policy makes no reference to reimbursement to utility owners for the cost of adjusting or installing utilities on freeways. Reimbursement is subject to State laws.

It is the intent of this policy to establish procedures whereby the individual State highway authorities may uniformly administer the same.

STATEMENT OF POLICY

1. Utilities to Which Policy Applies

The principles set forth in this policy apply to all public and private utilities including but not limited to communication, electric power, water, gas, oil, petroleum products, steam, sewer, drainage, irrigation, and similar facilities. Such utilities may involve construction and maintenance of underground, surface or overhead facilities, either singly or in combination.

This policy shall apply to utilities located within public freeway right-of-way.

This policy does not apply to utility lines for servicing facilities required for operating the freeway.

2. New Utility Installations Along Freeways

New utilities will not be permitted to be installed longitudinally within the control of access lines of any freeway, except that in special cases such installations may be permitted under strictly controlled conditions. Utilities will not be allowed to be installed longitudinally within the median area.

Where such longitudinal installations are requested, the utility owner must in each case show to the State highway agency's satisfaction:

A. That the accommodation will not adversely affect highway and traffic safety.

B. That alternate locations are not available or cannot be implemented at reasonable cost, from the standpoint of providing efficient utility services in a manner conducive to safety, durability, and economy of maintenance and operations; that the accommodation will not adversely affect the

design, construction, operation, maintenance, or stability of the freeway; and that it will not interfere with or impair the present use or future expansion of the freeway.

C. That disapproval of the use of the right-of-way would result in the loss of productive agricultural land, or loss of productivity of agricultural land, if any. In this case, the utility must provide information on the direct and indirect environmental and economic effects of such loss, which effects will be evaluated and considered by the highway agency.

D. That the accommodation satisfies the conditions of Item 7, "Access for Constructing and/or Servicing Utilities."

All longitudinal utility accommodations as may be warranted herein shall only be in accordance with an approved permit issued by the State highway agency.

Where longitudinal utility installations must traverse interchange areas, they shall be located and treated in the same manner as utility crossings within interchange areas, as in Item 5 which follows.

Service connections to adjacent properties shall not be permitted from longitudinal utility installations located within the access control lines of a freeway.

3. Existing Utilities Along Proposed Freeways.

Where a utility already exists within the proposed right-of-way of a freeway and it can be serviced, maintained and operated without access from the through traffic roadways or ramps, it may remain as long as it does not adversely affect the safety, design, construction, operation, maintenance or stability of the freeway. Otherwise, it must be relocated, except for special cases as covered by Item 2.

4. Major Valley Crossings

Where a freeway crosses a major valley or river on an existing structure, any utility carried by said structure at the time the highway route is improved may continue to be so carried when relocation of the utility would be very costly and provided the utility can be serviced without interference with road users.

Expansion of a utility carried by an existing structure across a major valley or river may be permitted provided the utility can be installed and serviced without interference with road users.

A new utility will not be permitted to be installed on a structure across a major valley or river at and after the time the highway route is improved, except for special cases as covered by Item 2.

5. Utilities Crossing Freeways

New utility installations and adjustments or relocations of existing utilities may be permitted to cross a freeway. To the extent feasible and practicable they should cross on a line generally normal to the freeway alignment and preferably under the freeway.

5(A) Utilities Along Roads or Streets Crossing Freeways

Where a utility follows a crossroad or street which is carried over or under a freeway, provision should be made for the utility to cross the freeway on the locations of the crossroad or street in such manner that the utility can be constructed and/or serviced without access from the through-traffic roadways or ramps. Generally the utilities are to be located within the right-of-way of the crossroad or street, existing or relocated, and may cross over or under the freeway or be carried on or through the highway grade separation structure, provided installation and servicing thereof can be accomplished without access from the through-traffic roadways or ramps. Where distinct advantage and appreciable cost saving is effected by locating the utilities outside the right-of-way of the crossroad or street they may be so located, in which case they shall be located and treated in the same manner as utility lines crossing

the freeway at points removed from grade separation structures as in (B) and (C) which follow.

5(B) Overhead Utility Crossings

Overhead utility lines crossing a freeway at points removed from grade separation structures, or those crossing near a grade separation but not within the right-of-way or a crossroad or street, in general, should be adjusted so that supporting structures are located outside the outer edges of through-traffic roadway side slopes and preferably outside the control access lines. In any case supporting poles shall not be placed within the appropriate clear zone as designated in the current edition of the AASHTO publication *Roadside Design Guide* . Where spanning limitations so require, intermediate supporting poles may be placed in medians of sufficient width to provide the above referenced clear zone from the edges of both roadways, provided the conditions of Item 7, "Access for Constructing and/or Servicing Utilities," are also met. If additional lanes are planned, the clear zone shall be determined from the ultimate edges of the roadway. Where right-of-way lines and control of access lines are not one and the same, as where frontage roads are provided, supporting poles may be located in the area between them. In extraordinary cases where such spanning of the roadways is not feasible, consideration may be given to conversion to underground facilities to cross the freeway.

At interchange areas, in general, support for overhead utilities should be permitted only where all of the following conditions are met: (a) the above indicated clear zone is provided with respect to the freeway through-traffic lanes, (b) the appropriate clear zone from edge of ramp is provided as designated in the above referenced AASHTO *Roadside Design Guide*, (c) essential sight distance is not impaired, and (d) the conditions of Item 7, "Access for Constructing and/or Servicing Utilities," are satisfied.

The vertical clearance to overhead utility lines crossing freeways shall be determined by the State but in no case shall be less than the clearance required by the National Electrical Safety

Code, ANSI C2, Institute of Electrical and Electronics Engineers, Inc.

5(C) Underground Utility Crossings

Utilities crossing underground below the freeways shall be of durable materials and so installed as to virtually preclude any necessity for disturbing the roadways to perform maintenance or expansion operations. The design and types of materials shall conform with appropriate governmental codes and specifications. Where conditions are such that the drainage structures can accommodate the utility, and the utility crossing can not reasonably be accomplished in some other manner, drainage structures may be used on a temporary basis for a utility crossing on a permit basis.

Manholes and other points of access to underground utilities may be permitted within the right-of-way of a freeway only when they are located beyond the shoulders of the through-traffic roadways or ramps as planned for later widening, if any, and provided the conditions of Item 7, "Access for Constructing and/or Servicing Utilities," are satisfied.

5(D) Irrigation Ditches and Water Canals

Except for necessary crossings, water canals and irrigation ditches should be excluded from the right-of-way of freeways, except for special cases as covered by Item 2. Crossings may be made by underground siphon, or through culverts, or bridges as appropriate to the size of canal, topographic conditions, and highway safety aspects. In general, locations and structures are to be designed in the same manner as are facilities for natural transverse drainage.

All access and egress for servicing or patrolling such facilities shall be from outside the control of access lines. Ditch-walkers or ditch-riders shall not be permitted to indiscriminately cross the freeway at grade. Under appropriate traffic control arrangements, special ditch cleaning equipment may be permitted to cross in those

cases where considerable extra travel distance would otherwise be required to utilize grade separation structures.

5(E) Provisions for Expansion of Utilities

When existing utilities are relocated or adjusted in conjunction with construction of a freeway, provision may be made for known and planned expansion of the utility facilities, particularly those underground. They should be planned to avoid interference with traffic at some future date when additional or new overhead or underground lines are installed.

6. Utilities in Vehicular Tunnels

As a general rule utilities will not be permitted to occupy vehicular tunnels on freeways on new location, except in special cases as covered by Item 2.

Utilities which transport a hazardous material shall not be allowed in a vehicular tunnel under any circumstances.

Where a utility occupies space in an existing vehicular tunnel that is converted to a freeway, relocation of the utility may not be required. Utilities which have not previously occupied an existing vehicular tunnel that is incorporated in a freeway will not be permitted therein, except in special cases as covered by Item 2.

7. Access for Constructing and/or Servicing Utilities

In general, utilities are to be located and designed in such a manner that they can be constructed and/or serviced without direct access from the through roadways or connecting ramps. Such direct access shall not be permitted except for special cases where alternate locations and/or means of access are unavailable or impractical due to terrain and/or environmental constraints, and such use will not adversely affect safety or damage the state's facility. Where direct access is requested, a permit must be obtained from the highway agency.

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Access for construction and/or servicing a utility along or across a freeway should be limited to access via (a) frontage roads where provided, (b) nearby or adjacent public roads and streets, or (c) trails along or near the highway right-of-way line, connecting only to an intersecting road, from any one or all of which entry may be made to the outer portion of the freeway right-of-way. Subject to Section 111 of Title 23, U.S. Code, a locked gate along the freeway fence may be utilized to meet periodic service access needs. Where a gate is allowed, it will be documented by an approved permit which will include adequate provision against unauthorized use.

In those special cases where utility supports, manholes, or other appurtenances are located in medians, interchange areas, or otherwise inaccessible portions of freeway rights-of-way, access to them from through-traffic roadways or ramps may be permitted when other alternatives do not exist. Such access shall be by permit setting forth the conditions for policing and other controls to protect highway users.

Entry to the median area should be restricted where possible to nearby grade separation structures, stream channel crossings, or, other suitable locations not involving direct access from through roadways or ramps.

Where utilities are located outside the control of access line and where such utilities may require maintenance from within the freeway right-of-way, a permit must be obtained from the highway agency.

All permits will include adequate provisions for control of access to the utility work zone, direction of traffic and protection of workers and the traveling public.

Advance arrangements should also be made between the utility and the highway agency for emergency maintenance procedures.

8. Construction and Location Details

The highway agency which constructs or maintains freeways has the right to review and approve the location and design of all utility installations and adjustments affecting the highway and issue permits for the contemplated work.

9. Manner of Making Utility Installations and Adjustments

In general, utility installations and adjustments are to be made with due consideration to highway and utility costs and in a manner that will provide maximum safety to the highway users, will cause the least possible interference with the highway facility and its operation, and will not increase the difficulty of or cost of maintenance of the highway.

Utility installations and adjustments within freeway right-of-way shall be guided by the AASHTO publication *A Guide for Accommodating Utilities Within Highway Right-of-Way*, as outlined in the "Scope "of said guide.

A POLICY ON DESIGN STANDARDS - INTERSTATE SYSTEM

Prepared by the
AASHTO Highway Subcommittee on Design

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A POLICY ON DESIGN STANDARDS - INTERSTATE SYSTEM

GENERAL

The National System of Interstate and Defense Highways is the most important in the United States. It carries more traffic per mile than any other comparable national system and includes the roads of greatest significance to the economic welfare and defense of the Nation. The highways of this system must be designed in keeping with their importance as the backbone of the Nation's highway systems. To this end, they must be designed with control of access to ensure their safety, permanence and utility and with flexibility to provide for possible growth in traffic.

These objectives can be realized by conscientious attention to design. All interstate highways shall meet the following minimum standards for segments constructed on new right-of-way and segments undergoing complete reconstruction along existing right-of-way. The standards for horizontal alignment, vertical alignment and cross-sectional elements for resurfacing, restoration and rehabilitation projects may be the AASHTO interstate standards that were in effect at the time of the original construction. Designs will generally be made to values as high as are commensurate with conditions. Values approaching the minimums herein will be used only where the use of higher values will result in unacceptable social, economic or environmental consequences.

The current editions of the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* and the *Standard Specifications for Highway Bridges* shall be used as design guides where they do not conflict with these standards.

DESIGN TRAFFIC

Each section of interstate highway shall be designed to serve safely and efficiently the volumes of passenger vehicles, buses, trucks including tractor-trailer and semi-trailer combinations, and corresponding military equipment estimated for the design year. In all but extraordinary circumstances, the design year for new construction and complete reconstruction is to be 20 years beyond that which the plans, specification and estimate for construction of the section are approved. In those extraordinary instances where environmental and/or political decisions intervene, the design year and resulting traffic will be consistent with that decision.

The traffic volumes used for design shall be the 30th highest hourly volume of the design year, hereafter referred to as the design hourly volume, "DHV." Unless otherwise specified, DHV is the total, two-directional volume of mixed traffic. DDHV is the directional distribution of traffic on multi-lane facilities during the design hour.

RIGHT-OF-WAY

Right-of-Way

The width of right-of-way shall be sufficient to accommodate the roadway cross section elements and requisite appurtenances necessary for an adequate facility.

Control of Access

Access to the interstate system shall be fully controlled. Access is to be achieved by interchanges at selected public highways. Access control shall extend the full length of ramps and terminals on the crossroad. Such control shall either be acquired outright prior to construction or by the construction of frontage roads or by a combination of both.

Control for connections to the crossroad should be effected beyond the ramp terminals by purchasing access rights, providing frontage roads, controlling added corner right-of-way areas, or denying driveway permits. Such control should extend beyond the ramp terminal at least 100 feet in urban areas and 300 feet in rural areas.

The interstate highway shall be grade separated at all railroad crossings and selected public crossroads. All at-grade intersections of public highways and private driveways shall be eliminated. To accomplish this the connecting roads are to be terminated, rerouted, or intercepted by frontage roads.

GEOMETRIC CONTROLS AND CRITERIA

Design Speed

The design speed for interstate highways shall be at least 70, 60 and 50 miles per hour for level, rolling, and mountainous topography respectively and depending on the nature of the terrain and development. In urban areas, the design speed shall be at least 50 miles per hour.

Sight Distance

Stopping sight distance desirably should be in the upper range of values established in the current edition of AASHTO's *A Policy on Geometric Design of Highways and Streets* for the appropriate design speed.

Curvature and Superelevation

These elements and allied features, such as transition curves, should be correlated with the design speed in accordance with the current edition of AASHTO's *A Policy on Geometric Design of Highways and Streets*.

Gradients

For design speeds of 70, 60, and 50 miles per hour, gradients generally shall not be steeper than three, four, and five percent, respectively. Gradients two percent steeper may be provided in mountainous terrain and one percent steeper in urban areas with crucial right-of-way controls.

CROSS SECTION ELEMENTS

Number of Lanes

A minimum of four traffic lanes shall be provided on the Interstate System. The number of lanes shall be sufficient to accommodate the selected DHV at an acceptable level of service, and shall be determined on the basis of service volumes for the applicable conditions as given in the current edition of AASHTO's *A Policy on Geometric Design of Highways and Streets*. On ascending grades which exceed the critical design length, a climbing lane analysis should be made and climbing lanes added where appropriate. Likewise, on extended lengths of maximum or near maximum descending grades emergency escape ramps should be added where an evaluation indicates they are required.

Width of Traffic Lanes

All traffic lanes shall be at least 12 feet wide.

Shoulders

On the right of traffic, the paved width of shoulder shall not be less than 10 feet. Where truck traffic exceeds 250 DDHV, a paved shoulder width of 12 feet should be considered. In mountainous terrain involving high cost for additional width, the paved width of shoulder may be less but must be at least six feet.

On the left of traffic on a four lane section, the paved width of shoulder shall be at least four feet. On six or more lane sections, a

10-foot paved width should be provided and where truck traffic exceeds 250 DHV in each direction 12 feet should be considered.

Pavement and Shoulder Cross Slope

The pavement cross slope shall be a minimumof 1.5 percent and desirably 2 percent. In areas of intense rainfall the cross slope may be increased to 2.5 percent. On tangent sections, paved shoulders should have a cross slope in the range of 2 to 6 percent but not less than the cross slope of the adjacent pavement.

Sideslopes

Foreslopes within the clear zone should be a maximum of 4:1 wherever feasible, and desirably should be 6:1 or flatter. When steeper slopes are utilized, barriers should be installed as warranted in accordance with current criteria.

Medians

Medians in rural areas in level or rolling topography shall be at least 36 feet wide. Medians in urban and mountainous areas shall be at least 10 feet wide. Consideration should be given to decking median openings between parallel bridges when the opening is less than 30 feet wide.

Horizontal Clearance to Obstructions

A recovery area clear of unyielding objects should be provided. When provision of such an area is not practicable, any unyielding objects within its limits are to be made breakaway or are to be shielded by installation of crashworthy barriers or attenuators. Similarly, to the extent practicable, the pier and abutment supports for another highway or for a railroad overpass structure should be designed to provide a lateral clearance equal to the clear recovery area.

The width of the clear recovery area is to be commensurate with the selected design speed and roadside conditions. The width is to

be determined through application of currently accepted procedures. In restrictive areas, it may be necessary to construct barriers, walls, piers, abutments or other unyielding objects nearer to the traveled way than the width required for a clear recovery area. The minimum lateral clearance from the edge of the through lanes to the face of such objects shall be the shoulder width with appropriate crashworthy barriers and attenuators.

Curbs

In general, barrier curbs should not be used. However, if a special case arises which mandates such use, the barrier curb shall not be closer than the outer edge of shoulder. Mountable curbs, when used, should also be located at the outer edge of shoulder.

INTERCHANGES

Interchanges are to be provided between all intersecting interstate routes, between other selected access controlled highways, and at other selected public highways to facilitate distribution of traffic. In general, each interchange is to provide for all traffic movements except where it can be shown that such a traffic need can be safely met at another interchange with limited inconvenience.

The ramp curvature, pavement widths and related elements which constitute an interchange shall be adequate to accommodate the appropriate design vehicles.

Spacing of interchanges has a significant effect on the operation of interstate highways. In areas of concentrated development, proper spacing may be difficult to obtain because of demand for frequent access. As a rule, minimum spacing should be one mile in urban areas and two miles in rural areas. In urban areas, spacing of less than one mile may be developed by grade-separated ramps or by adding collector-distributor roads.

BRIDGES AND OTHER STRUCTURES

General

The following standards apply to interstate highway bridges, overpasses and underpasses. Standards for crossroad overpasses and underpasses are to be those of the crossroad. Bridges and overpasses should be located to fit the overall alignment and profile of the highway.

Vertical Clearance

On all rural sections,the clear height of structures shall be not less than 16 feet over the entire roadway width, including the usable width of shoulder. In urban areas, the 16-foot clearance shall apply to a single routing. On other urban routes, the clear height shall be not less than 14 feet. Allowance should be made for future resurfacing. The vertical clearance to sign trusses and pedestrian overpasses shall be 17 feet. The vertical clearance from the deck to the cross bracing on through truss structures shall also be a minimum of 17 feet.

Cross Section

The width of all bridges, including grade separation structures, between rails, parapets, or barriers shall equal the full paved width of the approach roadways, which includes paved width of usable shoulders. Long bridges, defined as bridges having an overall length in excess of 200 feet may have a lesser width. Such bridges shall be analyzed individually. On long bridges, offsets to parapet, rail or barrier shall be at least four feet measured from the edge of the nearest traffic lane on both the left and the right.

Structural Capacity

All new bridges shall have at least an HS-20 structural capacity. A bridge can remain in place if the operating rating capacity can safely service the system for an additional 20-year service life.

Bridges to Remain

Mainline bridges on the interstate system may remain in-place if as a minimum, they meet the following values. The bridge cross section consists of 12-foot lanes, 10-foot shoulder on the right and 3.5-foot shoulder on the left. For long bridges, the offset to the face of parapet or bridge rail on both the left and right is 3.5 feet measured from the edge of the nearest traveled lane. Bridge railing shall meet or be upgraded to current standards.

Tunnels

From the standpoint of service to traffic, tunnels should not differ materially from grade separation structures. Essentially the same standards apply except that minimum values normally are used because of high cost and restricted right-of-way.

The minimum roadway width between curbs shall be at least two feet greater than the approach traveled way width. The safety walk on either side shall be a minimum of 1.5 feet. The total clearance between walls of a two-lane tunnel shall be a minimum of 30 feet. The roadway width and safety walk can be varied within the 30-foot minimum wall clearance; however, the widths shall not be less than the minimum values indicated above. The minimum vertical clearance may be 14 feet plus an allowance for resurfacing if an alternative routing is available which provides the minimum 16 feet of clearance. However, the desirable section for tunnels is a width of not less than 44 feet with two 12-foot lanes, a 10-foot right shoulder, a 5-foot left shoulder, and a 2.5-foot safety walk on each side.

BENEFITS OF MAGNETICALLY LEVITATED HIGH-SPEED TRANSPORTATION FOR THE UNITED STATES

Volume 1 — Executive Report

prepared by
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Committee on Environment and Public Works

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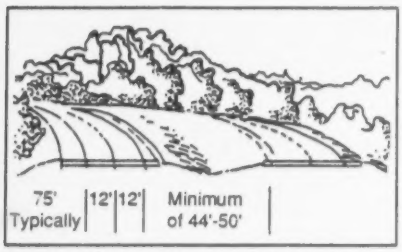
MAGLEV AND THE INTERSTATE HIGHWAY SYSTEM

High speed Maglev systems can be built to run beside existing Interstate highways at acceptable cost and without significantly interfering with normal highway operation.

A typical construction for rural Interstates is shown below. The two roadways are separated by a median, which is typically about 50-feet wide. At the side, the distance from the outer edge of the roadway to the right-of-way boundary is usually at least 75 feet. Urban Interstates, which comprise 25% of total Interstate mileage, have significantly narrower medians and side rights of way, and the surrounding area is usually built up.

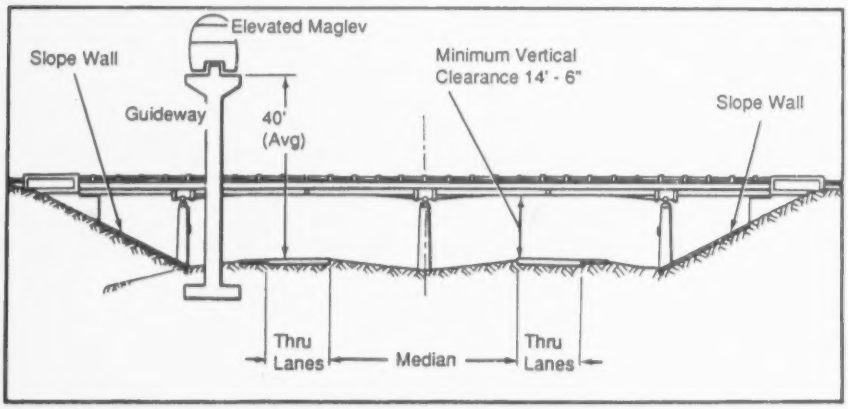


There's ample clearance on rural Interstates for Maglev construction along the median or the right of way.

The physical features of the Interstates—curves, dips and rises, median and side right-of-way widths, bridges and interchanges—constrain Maglev design options, however, and may limit vehicle speed at some locations.

A Maglev guideway will encounter many overpasses and interchanges along its route. Bridges average about one mile apart on rural Interstates, approximately one-half mile on urban Interstates. Most of these bridges are overpasses, where the intersecting highway goes over the Interstate, as illustrated below. Overpasses and ramps constrain Maglev design. Generally, there is not enough room to pass under the bridge at the side, and the guideway would intersect the ramps in any event. Since it is probably not acceptable to relocate or modify most of the bridges and ramps on the Interstates, there are only two options if Maglev systems are to use Interstate rights of way:

- ☐ *Elevate the Maglev guideway to a height of approximately 40 feet, allowing it to pass over existing structures with adequate clearance.* The elevated guideway could either run along the side of the Interstate—the most likely alternative—or in the median if it is sufficiently wide.



Elevating the Maglev guideway provides adequate clearance over existing Interstate bridges and other structures.

16

- *Run the Maglev guideway at grade level in the median, passing under existing bridges.* This is suitable only for those sections of the Interstates where the medians are wide, straight, and level. If the roadway curves at a faster rate than the high speed Maglev can follow, the guideway must leave the median and go over the roadway. Long spans—hundreds of feet—then result because of the shallow angle between the guideway line and the roadway. Rolling terrain also poses problems for on-grade guideways. Extensive cut and fill operations would be required to maintain a level guideway. This option probably is not practical for most portions of the Interstates.

Another option—that of on-grade or moderately elevated guideways that rise to clear bridges, ramps, and other obstructions—does not appear acceptable. The "transition" distance—the length of the guideway that deviates from a straight, flat path to go over an obstacle—depends on vehicle speed.

If the normal height of the guideway is 20 feet above the roadway, for example, the transition distance to go over a typical overpass is 0.6 mile at 225 miles per hour and 0.8 mile at 300 miles per hour, based on a maximum allowable vertical acceleration of 0.10 g. This assumes that the guideway curves only in the vertical plane. Since distances between overpasses average about the same, vehicles would have to go up and down almost continuously, which probably would disturb passengers.

Elevating the guideway to clear bridges and other obstacles allows Maglev to adapt to rolling terrain.

Vertical acceleration effects can be minimized and the transition distance somewhat shortened by simultaneously curving and banking the guideway in a horizontal direction—the equivalent of a chandelle maneuver in an airplane—though right-of-way constraints may limit such maneuvers. In any case, passengers probably will not tolerate changing vehicle direction every few seconds to clear overpasses. For ride acceptability, Maglev guideways should be flat and straight, with relatively infrequent vertical or horizontal accelerations and at a sufficient height to routinely clear bridges and interchanges.

Maglev vehicles can negotiate virtually all grades on U.S. Interstates at normal speed and with acceptable guideway heights.

Elevating the guideway to clear bridges and other obstacles also allows Maglev to adapt to rolling terrain. Pier height can be adjusted to maintain a flat guideway, even though local ground elevation changes. Occasionally, guideways will have to deviate from flatness to meet long up-and-down grades or large hills. Analyses indicate that such obstacles can be traversed without significant reductions in speed and with allowable vertical accelerations. Guideway transition distances are typically less than a mile, and changes in guideway height are reasonable. Maglev vehicles can negotiate virtually all grades on the Interstates at normal speed and with acceptable guideway heights.

Where the median strip is sufficiently straight and wide, guideways can be located on it. For those sections of the Interstates with curves or narrow medians, however, the guideways can be located along the side of the highway. This avoids forcing the guideway to span the roadway (which would be necessary if the guideway were located on the median) when the Interstate curves relatively rapidly. When guideways are at the side, they can leave the right of way without crossing the roadway.

Generally, it appears that vehicles will be able to negotiate most curves on rural Interstates at high speed. The curves are typically gentle, and additional rights of way can be acquired if necessary.

Curves on urban Interstates are more of a problem, since rights of way are usually narrower, the surrounding areas built up, and the curves tighter. Average vehicle speed on urban Interstates will usually be less than on

rural Interstates, probably in the range of 100 to 150 miles per hour. Stations will be relatively close together in urban areas, and it often will not be desirable to accelerate to high speed. With speeds in the range of 100 to 150 miles per hour, vehicles can negotiate most curves without significantly deviating from existing urban rights of way.

Wind effects from moving Maglev vehicles are minor...noise levels are low.

For abrupt angle curves—rare on Interstates, but they do occur—the guideway will depart from the right of way. For a 30-degree sharp inside curve, the guideway will have a maximum deviation of 250 feet from the right of way for a vehicle speed of 225 miles per hour. This deviation occurs at the point where the roadway makes its abrupt turn. The deviation is less before and after the turn. Maximum deviation of the guideway from the right of way is several times greater for outside curves than for inside curves. When possible, guideways should be located on the inside of the sharpest curves. Optimizing guideway placement will be important in planning Maglev routes.

It should be noted that it is not necessary or desirable that Maglev vehicles stop at every station in urban regions, however. By using off-line loading, Maglev vehicles will be able to stop at selected stations and bypass others. This will minimize start/stop accelerations and delays. The short headways between vehicles that is practical with Maglev will allow passengers to board vehicles to take them to their desired station with a minimum of intermediate stops and waiting.

Wind effects from moving Maglev vehicles are minor. At a distance of 50 feet from the centerline of a 300-mile-per-hour Maglev vehicle, the induced wind speed as it passes is only 3 miles per hour. Effects on highway traffic and surrounding structures will be negligible. At 15 feet—the distance between oppositely moving Maglev vehicles on a double track guideway—induced wind speed is only 20 miles per hour, which is much less than vehicle cruising speed.

Noise levels are low. Maglev vehicles carry no power source; they are driven by track current and do not contact the guideway. The only source of noise is aerodynamic effects on the vehicle body. With elevated guideways and a distance of 50 feet to the roadway, vehicle noise level at the highway is only 70 decibels. This is well below normal auto and truck traffic noise.

A guideway design that minimizes field construction is very desirable. Not only does it reduce cost, but it minimizes disruption of highway traffic when guideways are installed. Elevated guideways would be constructed with prefabricated beams and piers. The piers would be installed on poured concrete footings, and the beams with their aluminum conductors then laid on top. After initial installation, the beams would be adjusted to meet flatness and straightness requirements.

The optimum distance between piers is probably in the range of 50 to 100 feet. Prefabricated beams and piers are light enough to be transported by truck to a convenient access point, where they would be unloaded, then carried along the finished portion of the guideway to their installation point. With this technique and multiple access points, many miles of Maglev routes could be built each year with minimal interference to Interstate traffic or environmental disruption. Detailed cost estimates have not yet been made, but rough estimates indicate that a two-way guideway should cost about $11–13 million per mile for components and installation.

Key Maglev goals: to select an approach that will not become obsolete ...to ensure operation under all U.S. weather conditions.

Compatible vehicle and guideway technology should be used on all Interstate Maglev routes. A key goal in developing the Interstate Maglev system is to select an approach that will not become obsolete and will continue to provide superior performance.

A second key goal is to ensure that the Interstate Maglev system can operate under

all U.S. weather conditions, including heavy snowstorms in the northern and central regions. Plowing or heating hundreds of miles of elevated guideways appears difficult. Guideways may have to be self-cleaning and not accumulate snow and ice. It is not clear to what extent winds induced by moving Maglev vehicles can prevent accumulation. They probably can blow powdered snow away, but may not remove densely packed snow and ice.

Safety and protection of the Maglev system is of prime importance. Highway traffic should not generate safety problems for the Maglev system and vice versa. In general, elevating the guideway resolves many potential safety concerns. Access to the guideway will be restricted, minimizing the possibility of objects being deliberately or accidentally placed on it. Barriers can protect the piers from impact with trucks and autos that leave the roadway. Noise and wind effects on highway traffic appear to be negligible. And locating the guideways at the side of the roadway will minimize visual distraction, since most drivers tend to look forward to the highway vanishing point.

Maglev can help bring depressed regions into an integrated national transport system, improving living standards and relieving overcrowding.

The first generation Maglev systems now being tested in Japan and the Federal Republic of Germany are not optimized for application to the U.S. Interstates. Issues for Maglev Interstate systems include compatability with existing bridges and interchanges, field construction requirements, and ability to operate after severe winter storms.

Optimized second-generation Maglev systems can be developed to meet Interstate requirements, with low enough cost so that Maglev can be widely implemented. In our view, second-generation Maglev systems based on superconducting magnets appear more promising than systems based on electromagnets for three reasons:

- Superconducting Maglev vehicles will be lighter, typically 40 tons (gross) compared to 100 tons (gross) for electromagnetic Maglev vehicles. This will result in lighter, lower cost guideways.
- Large clearances between vehicles and the guideway—typically 6 inches for superconducting Maglev vehicles compared to 3/8 inch for electromagnetic Maglev vehicles—will make guideway installation and maintenance easier and cheaper.
- The guideway propulsion system is simpler and cheaper because drive windings for electromagnetic systems have a much smaller pitch and a more complex overlapping design.

We have examined promising Maglev Interstate routes to determine their transport potential. Three types of systems were investigated: metropolitan feeder, intercity linear corridor, and multistate networks.

Metropolitan feeder systems would interconnect distant portions of a metropolitan area and its central core. A Long Island-New York City Maglev system (I-495) was examined in detail. Overall length is about 100 miles, with an average spacing between stations of approximately 15 miles. Operating speed would be 100 to 150 miles per hour. Many U.S. metropolitan regions—Washington, D.C., Los Angeles, and Chicago, for example—could increase mobility using Maglev feeders along the Interstates.

Intercity linear corridors also appear very promising. We examined a San Francisco-Los Angeles-San Diego Maglev system (I-5) and concluded that this corridor, along with side branches (I-10), would serve almost all of the population of California. Other possible linear corridors include Boston-New York-Washington, D.C., Chicago-Detroit, and Dallas-Fort Worth-Houston.

Maximum benefits will result from multistate Maglev system networks. The Interstate highway system has been extremely successful. It interconnects the major U.S. economic centers, with minimum travel time and delay. As in any network, the number of connections increase as n times n, where n is the total number of different nodes. The Interstate highway system would be much less useful if it were just separate linear corridors

between cities, with little or no interconnections. Similarly, Maglev systems will be most useful if they form interconnected networks.

An example of Maglev networks connecting most of the major U.S. economic and population centers is shown below. The Eastern U.S. is served by three networks—Northern, South Central, and Southeast. Additional Maglev links between New Orleans-Birmingham, Tulsa-Kansas City, and Norfolk-Chattanooga would tie the East into one large network. Other links could tie the Western U.S. to the East.

In considering potential routes, it should be kept in mind that Maglev will not only be useful in connecting present population and economic centers, but can enable new and more desirable population distributions. Many regions in the U.S. now suffer economically because they are not served by effective transport. Maglev can help bring depressed regions into an integrated national transport system, improving living standards and relieving overcrowding.

Due to limited time and resources, the Maglev Interstate studies described in this report have been generic in nature, using average highway characteristics. The next step should be to investigate several promising Interstate routes in detail, taking into account actual features: curve type and radius of curvature; nature of terrain; right of way widths; and similar technical questions.

Maglev along existing U.S. Interstate highways would connect economic and population centers in various parts of the country.

CHARLES H. SMITH

EXECUTIVE DIRECTOR

FLORIDA HIGH SPEED RAIL TRANSPORTATION COMMISSION

TESTIMONY TO

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

SUBCOMMITTEE ON SURFACE TRANSPORTATION

U. S. HOUSE OF REPRESENTATIVES

THURSDAY, MAY 3, 1990

WASHINGTON, D.C.

311 SOUTH CALHOUN STREET, SUITE 202
TALLAHASSEE, FL 32301
904/487-4261

INTRODUCTION

Mr. Chairman, members of the Committee, I appreciate the opportunity to report on Florida's progress in bringing high speed ground transportation to our state - both high speed rail and maglev - and the important role the Federal government has with our projects.

I am Charles H. Smith, Executive Director of the Florida High Speed Rail Transportation Commission. I have been in this position since 1985, shortly after the High Speed Rail Act established the Commission and authorized it to bring high speed rail to Florida. Prior to that I was the State Railroad Administrator in Maryland.

Florida recognized the need for high tech transportation alternatives over 10 years ago when it began studying the feasibility of high speed rail and maglev.

My comments will focus on three areas:

- Florida's involvement with high speed rail and magnetic levitation train systems.
- The potential for colocating high speed ground transportation along interstate highways and other highway and rail corridors.

- Importance and necessity for safety standards to control and manage these systems.

I. FLORIDA'S INVOLVEMENT WITH HIGH SPEED RAIL AND MAGNETIC LEVITATION TRAIN SYSTEMS

In the early 1980's the State began to study the feasibility of high speed rail and maglev for Florida. A High Speed Rail Committee sought expressions of interest from the U.S. and international market and commissioned a $500,000 feasibility study financed by the Federal Railroad Administration.

Passage of the 1984 Florida High Speed Rail Act created the High Speed Rail Transportation Commission and authorized it to seek applicants, establish criteria and award a franchise. The Commission is now over two-thirds through the review of a proposal of the Florida High Speed Rail Corporation, which plans to build, operate and finance a $2.5 billion system linking Miami, Orlando and Tampa. This company composed of a consortium of 35 U.S. and international companies, will use Swedish high speed train technology built by ASEA Brown/Boveri and capable of carrying passengers from one end of the route to the other in less than three hours. The ABB is the same company that supplies the high speed electric locomotive for the Northeast corridor metroliners.

The franchise award is planned for September 1991, the first phase between Orlando and West Palm Beach should be completed by 1995, and the entire system by 2006.

In 1988 a second project was added to the Commission's mandate. The Magnetic Levitation Demonstration Act signaled Florida's interest in expanding its high tech industry and encouraging the first commercial maglev project to be implemented in our state. The Commission has already completed its review of a proposal by Maglev Transit, Inc. to build a 14 mile, $454 million project between the Orlando International Airport and International Drive. It is expected that the Governor and Cabinet will issue its certification this fall. This project will use a German Transrapid 07 maglev system which is completing seven years of testing in West Germany. This project will be in operation in 1994.

II. THE POTENTIAL FOR COLOCATING HIGH SPEED GROUND TRANSPORTATION WITH INTERSTATE HIGHWAY RIGHT OF WAY.

Colocating high speed rail corridors along existing and future highway corridors is potentially one of the most cost effective transportation programs. This effort would encourage more public/private partnerships similar to Florida's program, as well as minimize environmental impacts.

The proposed high speed rail system in Florida is colocated with other existing corridors through 317 of its 325 total miles. Florida's Turnpike corridor accounts for 83 miles of the system, colocation with a electrical power line runs for 30 miles. The longest colocation is 204 miles along various segments of the CSXT railroad corridor. Under the present plan only eight miles will require property acquisition for new corridors. However, the High Speed Rail Act provides the State's eminent domain powers for new corridor acquisition and for any areas of existing corridor where the curvature might not be conducive to high speed rail.

The Florida high speed rail proposal calls for 95 to 100 feet of right of way depending on whether the colocation is along highway or rail corridor. The maglev project requires a 60 to 100 foot right of way including a buffer zone. In order to maintain acceptable speeds the high speed train, which could exceed 150 mph must maintain minimum track curvatures. (For 150 mph a minimum curve of 7,800' radius and for 200 mph a 14,000' radius curve.)

Integration of high speed transportation systems offers opportunities to maximize transportation capacity, minimize environmental and land impacts and provides economic and financial benefits, both to public and private entities. These important incentives attracted high caliber private sector interest to Florida's program and can be an important stimulus nationwide for

OTHER STATES TO ATTRACT PUBLIC/PRIVATE PARTNERSHIPS FOR HIGH SPEED TRAIN SYSTEMS

CURRENTLY THERE IS LEGISLATION IN BOTH HOUSES OF CONGRESS THAT SEEKS RESEARCH AND DEVELOPMENT FUNDS FOR MAGLEV TECHNOLOGY. TWO YEARS AGO, FLORIDA'S DELEGATION LED BY SENATOR BOB GRAHAM, FORMER SENATOR LAWTON CHILES AND THE LATE CONGRESSMAN CLAUDE PEPPER WAGED A SUCCESSFUL CAMPAIGN TO OBTAIN FEDERAL TAX EXEMPT BOND AUTHORITY FOR HIGH SPEED RAIL TRANSPORTATION.

III. DEVELOPMENT OF FEDERAL SAFETY STANDARDS FOR HIGH SPEED RAIL AND MAGLEV.

FLORIDA'S PROJECTS ARE NOW COMING TO GRIPS WITH THE CRITICAL SAFETY ISSUES. FOR THE PAST COUPLE OF YEARS THE COMMISSION HAS BEEN WORKING WITH THE FEDERAL RAILROAD ADMINISTRATION (FRA) TO ESTABLISH SAFETY REQUIREMENTS FOR FLORIDA AND PROVIDE A BASIS THAT CAN BE STANDARDIZED FOR APPLICATION NATIONALLY.

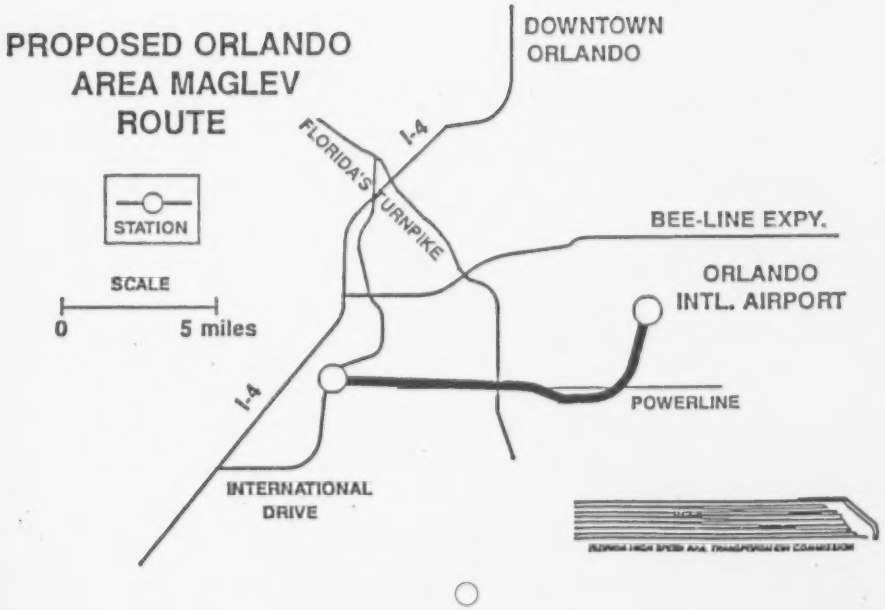
THE ULTIMATE SAFETY RESPONSIBILITY FOR ANY HIGH SPEED TRAIN SYSTEM (BOTH STEEL WHEEL ON RAIL AND MAGNETICALLY LEVITATED TECHNOLOGIES) RESTS WITH THE FRA. THE FRA HAS PROMOTED A VERY CONSTRUCTIVE AND COOPERATIVE EFFORT TO ESTABLISH THESE SAFETY STANDARDS. FEDERAL RAILROAD ADMINISTRATOR CARMICHAEL HAS SPEARHEADED THE FRA'S HIGH SPEED RAIL AND MAGLEV SAFETY PROGRAM. AS A MEANS TO ACQUIRE AND ASSESS TEST DATA ON THE GERMAN TRANSRAPID

TECHNOLOGY PROPOSED FOR THE ORLANDO PROJECT, A WORKING MEMORANDUM OF AGREEMENT HAS BEEN SIGNED BETWEEN FRA, THE COMMISSION AND THE TUV THAT WILL FACILITATE THIS EFFORT.

WE ARE NOT ONLY LOOKING AT THE SAFETY OF THE TECHNOLOGY, BUT ALSO SAFETY IN THE CORRIDOR SUCH AS THE ELIMINATION OF GRADE CROSSINGS, TRACK STRUCTURE, SOUND BARRIERS AND INFRASTRUCTURE STANDARDS. I AM CONFIDENT THAT A HIGH QUALITY SAFETY PROGRAM WILL RESULT FROM THE POSITIVE EFFORT THE FRA IS DIRECTING FOR FLORIDA AND THE REST OF THE COUNTRY.

CONCLUSION

AS WE ASSESS THE PAST AND PLAN FOR THE FUTURE OF OUR NATION'S INTERSTATE HIGHWAY SYSTEM, IT WILL BE OF GREAT PUBLIC BENEFIT TO INCLUDE HIGH SPEED RAIL AND MAGLEV IN OUR CURRENT AND FUTURE SYSTEM. THE ECONOMIC BENEFITS BROUGHT ABOUT BY COLOCATION AND PUBLIC/PRIVATE PARTNERSHIPS SHOULD NOT BE OVERLOOKED. THE TRANSPORTATION BENEFITS OF AN ALTERNATIVE MEANS OF TRAVEL WILL PROVIDE IMPROVED TRAVEL AND MAY REDUCE THE NEED FOR NEW PUBLIC HIGHWAY EXPENDITURES.

PROPOSED FLORIDA HIGH SPEED RAIL ROUTE

PROPOSED ORLANDO AREA MAGLEV ROUTE